STEEL

The

Metalworking Weekly

AUGUST 22, 1960

A PENTON PUBLICATION

How Much Bounce in the Fall Upturn?

Why Privately Held Firms 'Go Public'

Redesigned Lathe, New Tape Control Team Up to Cut Contouring Costs

How Semiautomatic Welding Stacks Up With Manual Electrode Process

How to Take Cost Out of Products

W. L. Davis, vice president-engineering, and his colleagues at Emerson Electric Mfg. Co., St. Louis, perform that function so effectively that cost reduction through product redesign accounted for $1 of every $3 in net profit last year for the electrical equipment producer. To learn how the men at Emerson wage their private war on costs, see Page 49.

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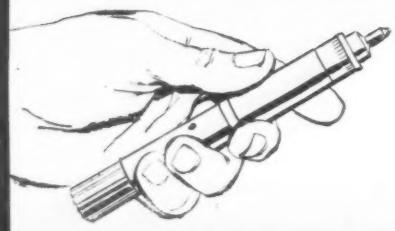
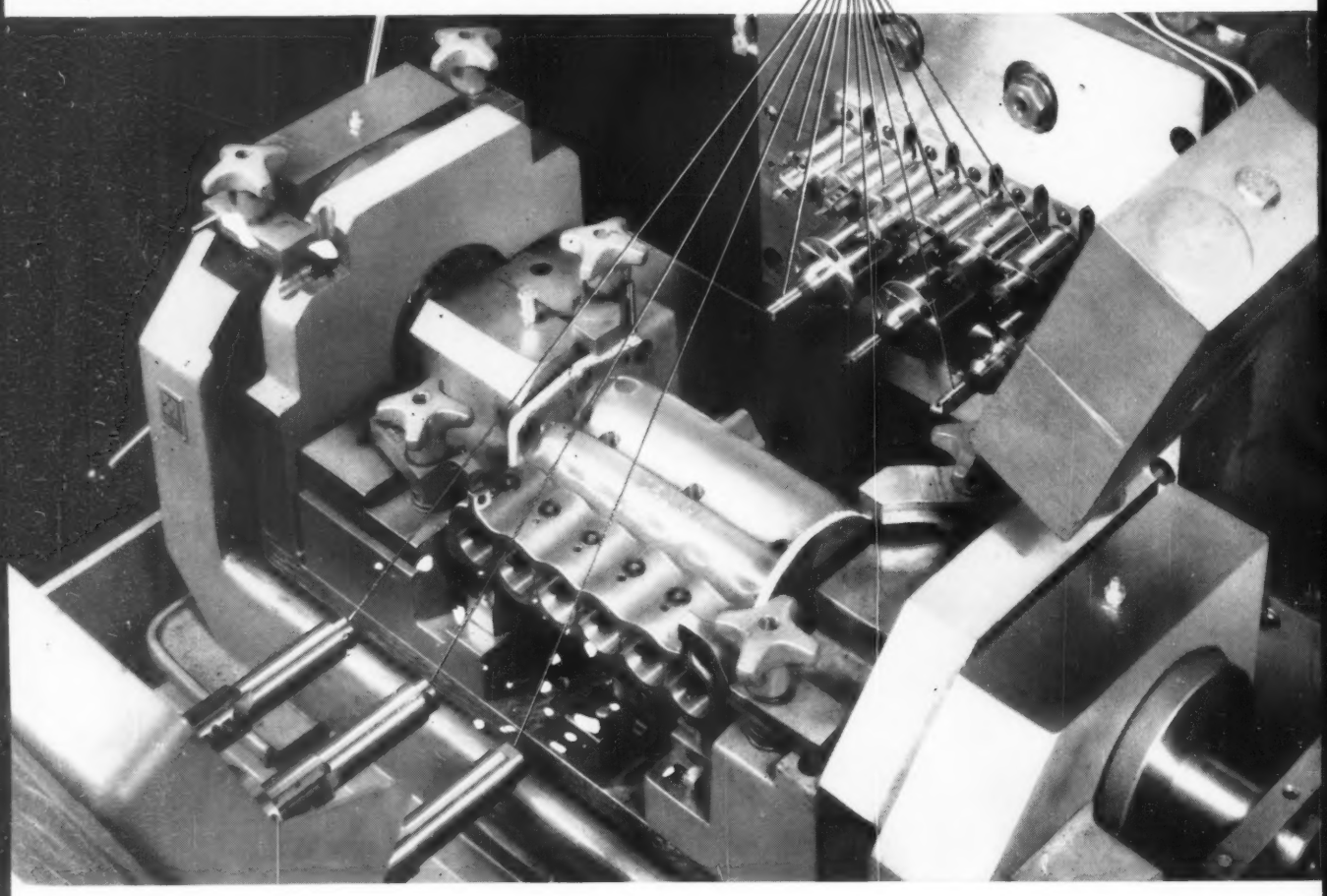


12 HEADS
are better than one



Heald Bore-Matic finishes up to 27 DIFFERENT SURFACES at a single loading

• In the setup shown above, 27 surfaces of 15 bores are done on one machine at a single loading—a Heald Model 222 Bore-Matic with Multi-Spindle heads with a trunnion type fixture. Six deep 3-step bores are done with the three left-hand heads with only one index of the cross slide. After indexing the fixture to hold the work vertical, nine right-angle bores are done at a single pass with the right-hand heads. The same machine also handles four-barrel pump housings, simply by removing one of the left-hand spindles and three of the right-hand spindles.

On multiple-hole Borizing jobs such as this, interchangeable Multi-Spindle Red-Head boringheads permit many operations to be combined on a single machine, with minimum indexing of the work and positive spacing between bores. Your Heald engineer will be glad to give you complete information.

It PAYS to come to Heald

MMT-PE

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Subsidiary of The Cincinnati Milling Machine Co.
Worcester 6, Massachusetts

Chicago • Cleveland • Dayton • Detroit • Indianapolis • Lansing • Milwaukee • New York • Philadelphia • Syracuse

HEALD

This Week in STEEL

The Metalworking Weekly

August 22, 1960 Vol. 147 No. 8

How Much Bounce in the Fall Upturn?

This is the time of year metalworkers begin seeking out factors to determine how much bounce the usual fall upturn will contain. The squeeze on profits, lagging appliance sales, and colorless steel operating rate contribute to pessimism this time of year. However, one of the basic indicators, personal income, is still rising. What's needed to bolster the fall outlook? Strengthen the consumer's confidence so he'll go on a shopping spree, say the economists. PAGE 40

'Going Public' Rides a Boom

Signals like these on the floor of the American Stock Exchange will be coming into play more often. An increasing number of firms is considering making a switch to public ownership for two big reasons: 1. To get money for expansion, diversification, and modernization. 2. To eliminate the danger of inheritance taxes wrecking the firm. Both advantages and disadvantages of "going public" are cited in a checklist, but the "pros" far outweigh the "cons." You'll also find several case histories. PAGE 42

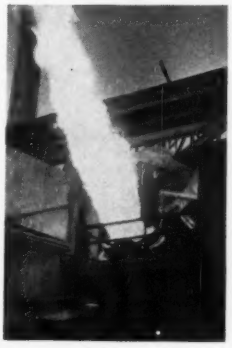
Tape Control, Lathe Team Cuts Contouring Costs

In an operation like numerically controlled turning, a prospective user has to decide whether he wants the full luxury of continuous path contouring, or the less expensive but still attractive positioning control. Now, a lathemaker and a control builder have come up with an answer they figure may let the user have his cake and eat it too. PAGE 74

Have You Considered Semiautomatic Welders?

Researchers at International Harvester Co. have been collecting comparison data on gas shielded, metal arcwelders vs. conventional processes for nearly a decade. They list some advantages of the newer systems. PAGE 76

Bessemer Process Updated with Steam-Oxygen Blowing



Open hearth grade steel can be made in bessemer converters by blowing with a mixture of steam and oxygen (see photo), says Gordon M. Yocom, assistant to the general manager at Steubenville (Ohio) Works, Wheeling Steel Corp. The company expects to change over two, 15 ton, bottom blown converters to the new process late this year, when a 400 ton oxygen plant will go on stream. Replacement of air in the blast with oxygen and vapor will reduce nitrogen content of the steel. It will also decrease conversion time. Wheeling's two converters have a rated capacity of 57,000 tons a month. They produce skelp billets. PAGE 82

Custom Aluminum Smelters Foresee Big Market Growth

Custom smelters have served notice they're out to capture a larger share of the aluminum market. Here's what the industry expects in terms of sales, markets, and prices. PAGE 105

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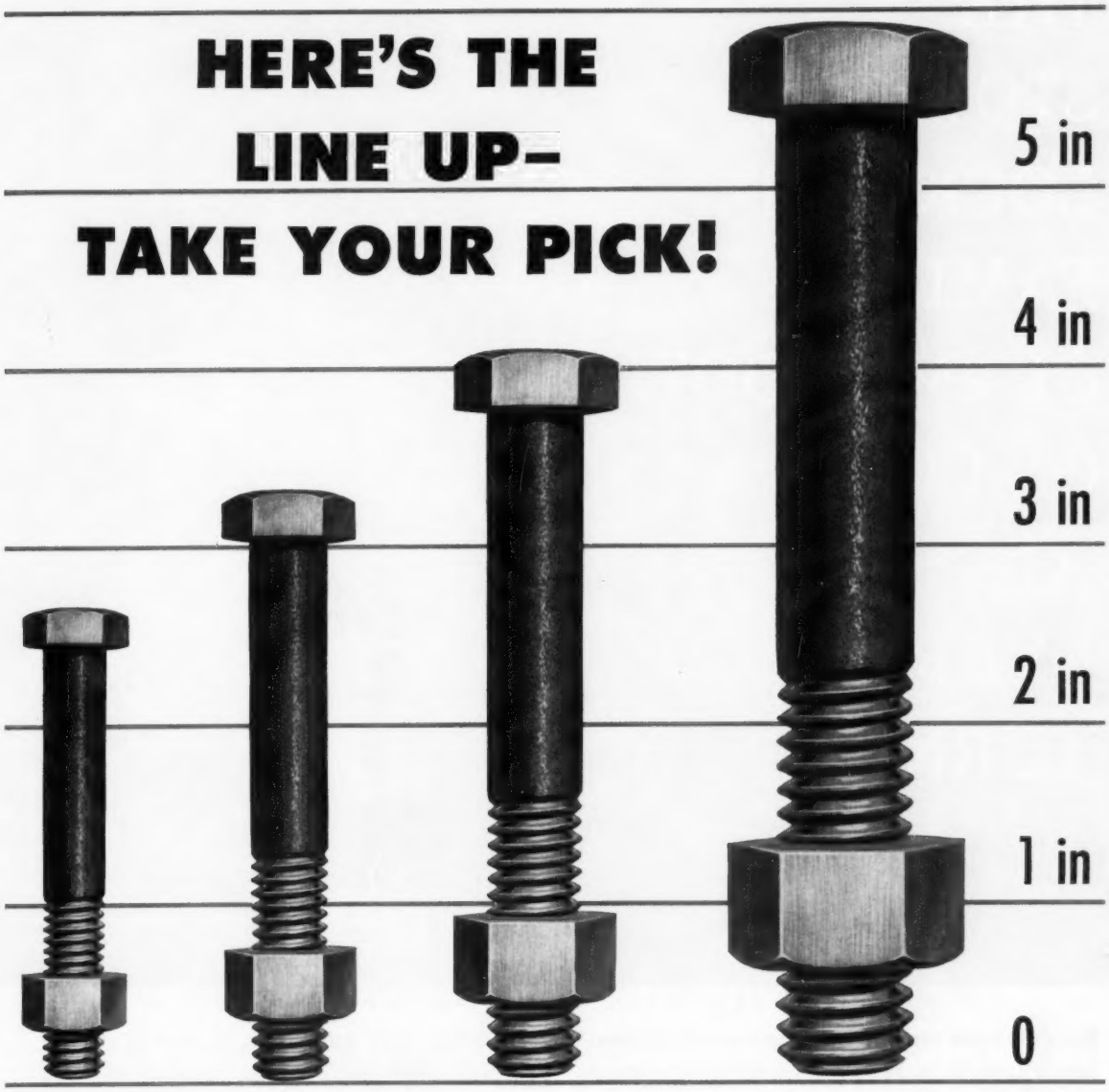
HERE'S THE LINE UP— TAKE YOUR PICK!



In the market for machine bolts?
We make a full line of sizes
Carriage, and lag bolts also.
And they're all top quality.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Export Distributor: Bethlehem Steel Export Corporation.

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. . . economy
. . . versatility

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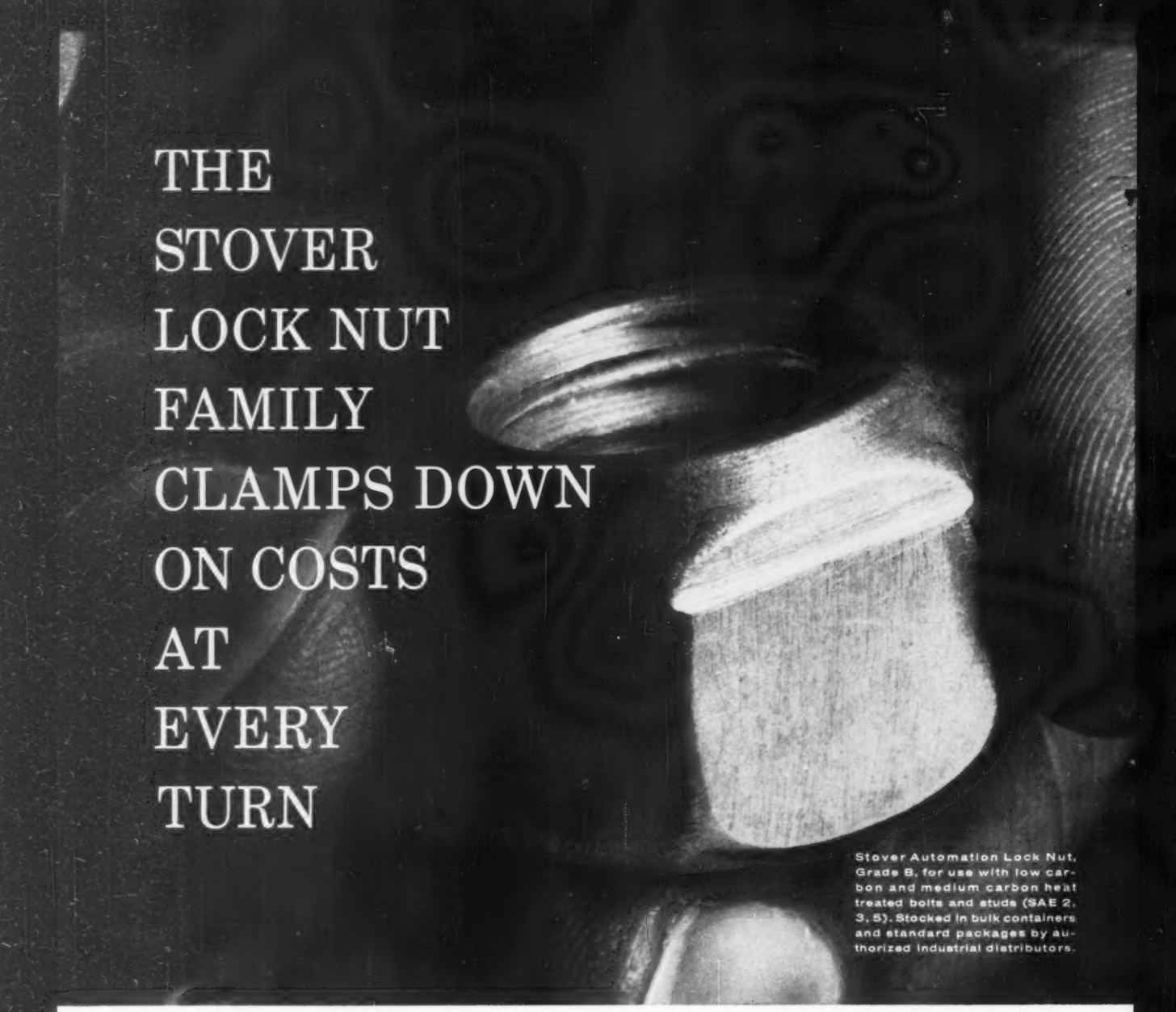

Stover Automation Lock Nut. Grade B, for use with low carbon and medium carbon heat treated bolts and studs (SAE 2, 3, 5). Stocked in bulk containers and standard packages by authorized industrial distributors.

Don't let the simple appearance fool you: Stover Lock Nuts take 25% less tightening torque to reach required clamping loads than common nuts or competitive lock nuts. This means you can use smaller, lighter driving tools. Yet Stover Lock Nuts won't back off by themselves—seated or unseated. Moreover, they start like common nuts, run up smoothly without galling or seizing, can be hand or hopper fed, and are fully reusable.

Car and tractor makers, for example, used about 80 million Stover Lock Nuts last year. The money these companies saved in *either* purchasing, assembly, or service-in-the-warranty-period easily paid for the lock nuts' initial cost. Value—in spades!

Stover Lock Nuts cost a little more than common nuts, but are very competitive with other lock nuts. They're available in bulk, with the popular styles also available through industrial distributors. Write us for the name of your nearest distributor, samples, or the just-published Stover Engineering Manual.

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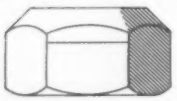
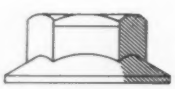
FIVE STANDARD STYLES

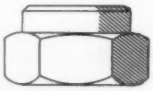


Automation
¼"—1"
A basic nut for general use.

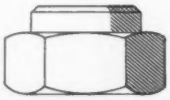


Flange
#8—½"
For clamping soft and/or thin materials.

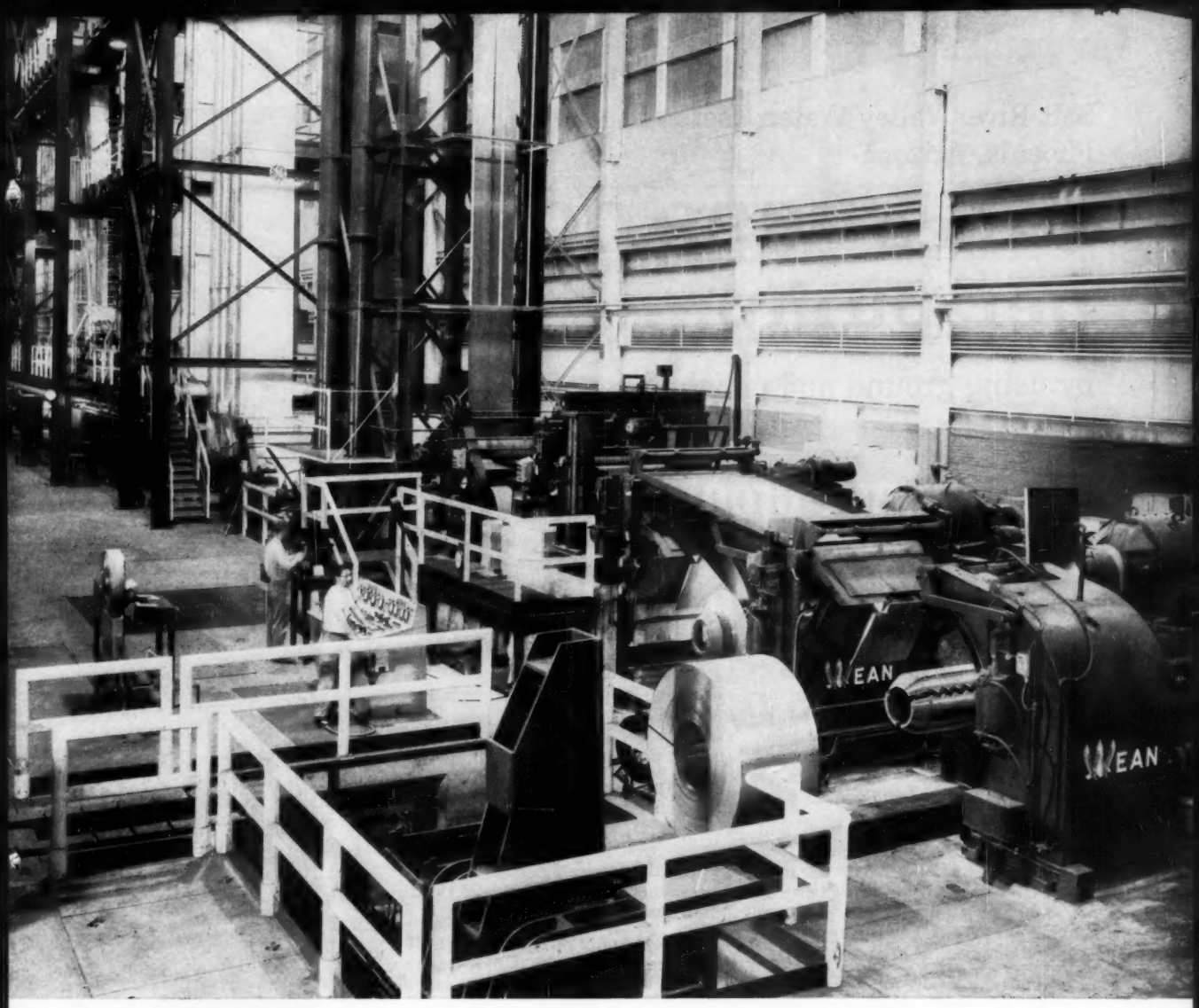
Thin Hex Collar
¼"—1½"
Used where space is a problem, such as on pinion and pulley shafts.



Hex Collar
⅞"—2"
Lower on-torque in the larger sizes than Automation style.



Heavy Hex Collar
⅞"—2"
Used where greater bearing surface is needed than available with Hex Collar style.



Wean incorporates new design features in Wheeling Steel's tin plate annealing line

The most recent addition to Wheeling Steel Corporation's tin plate processing facilities at its Yorkville plant was this Wean continuous annealing line. Designed to produce a wide range of closely controlled temper tin plate, the continuous annealing line was put into full-scale operation in May, 1959.

Among this line's new features are (1) improved design looping towers for entry and exit strip storage; (2) extra-high freeboards to check splashing of solutions in the cleaning tanks; (3) controlled atmosphere jet cooling system to bring strip to handling temperature; (4) a single, traveling down-ender to handle two recoilers. All tin plate gauges can be annealed on this new high speed Wean line.

Wean has established a long-standing partnership with the steel industry to fill the anticipated needs of its customers. Why not call upon Wean to assure proper planning for your expansion program or in modernization of your older facilities.

WEAN

THE WEAN ENGINEERING COMPANY, INC. • WARREN, OHIO

Salt River Valley Water Users Association,
Phoenix, Arizona

Saves $699.00 per pump...

by using ground and polished

fatigue-proof®
STEEL BARS
e.t.d.

made by elevated temperature drawing process

The men who operate the "Salt River" project have the job of supplying water to 240,000 acres of land in Arizona, where the Gila River joins the Salt River. The Association maintains some 250 deep well pumps to help supply the required water.

Richard Juetten, Supervisor of Salt River's Pump Division, reports that the use of La Salle FATIGUE-PROOF steel bars has permitted a saving of $699.00 per pump . . . a potential saving of $174,750 when applied to the 250 pumps now in operation.

Mr. Juetten's report follows:

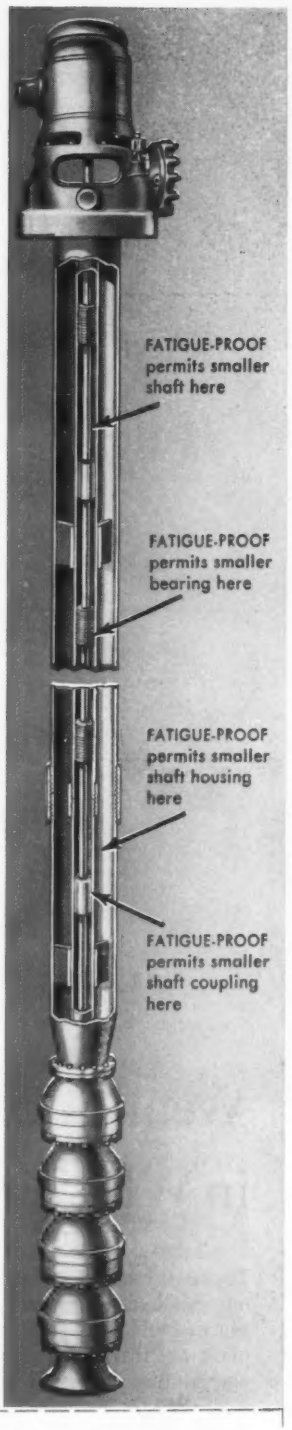
"I have figured our direct saving realized by using La Salle FATIGUE-PROOF steel bars in place of standard C-1045 steel shaft in our deep well turbine pumps.

"FATIGUE-PROOF enables us to use bars only $1\frac{11}{16}$" in diameter . . . instead of $2\frac{3}{16}$" diameter shafts which were necessary when we used C-1045 . . . and this despite higher horsepower, more weight, and additional pump bowl assemblies.

"Here are comparative costs per 10-foot section (of a 300-foot pump shaft):"

using C-1045		using FATIGUE-PROOF	
10' x 2-3/16" dia. shaft	$28.30	10' x 1-11/16" dia. FATIGUE-PROOF	$22.59
3½" shaft housing	26.30	3" shaft housing	19.80
2 bearings, 3½" x 2-3/16"	21.72	2 bearings, 3" x 1-11/16"	13.46
Shaft coupling	5.16	Shaft coupling	2.34
TOTAL cost	$81.48	TOTAL cost	$58.19
Cost per foot	$ 8.15	Cost per foot reduced to	$ 5.82

RESULT: A saving of $2.33 per foot . . . or $699.00 when applied to a 300-foot pump setting. And this doesn't take into consideration reduced power consumption.


FATIGUE-PROOF permits smaller shaft here
FATIGUE-PROOF permits smaller bearing here
FATIGUE-PROOF permits smaller shaft housing here
FATIGUE-PROOF permits smaller shaft coupling here

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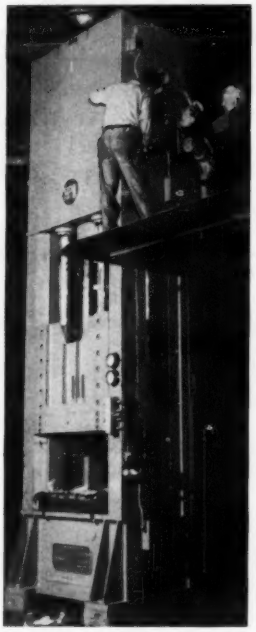
Here's a Glimpse . . .



. . . of the prodigious preparations for The Machine Tool Exposition—1960 at Chicago's International Amphitheatre. This triple action hydraulic press was the first of some 1000 machines to arrive for the show, which will run Sept. 6 through 16. Our editors will preview that show for you next week, as well as The Production Engineering Show which will be at Chicago's Navy Pier on the same dates, and The Coliseum Machinery Show which opens for nine days on Sept. 7 at Chicago's Coliseum. The editors teamed up months ago to gather material that's featured in this . . .

Contents Listing

A STEEL survey of machine tool buyers will reveal spending intentions for the rest of this year—with percentage changes in expenditures shown by machine types . . . The final installment in the "Project 1980" forecasts prepared for STEEL by Eddy-Rucker-Nickels Co., Cambridge, Mass. It will treat 20 year projections on prices, employment, production, among other factors, for all machinery except electrical . . . Our New Products and Equipment section will offer you a desk chair tour, pictorially, of equipment that will be unveiled at the shows . . . Who's who at the shows? To find out, just flip to our list of exhibitors.

The Real Showpiece . . .

. . . in Chicago may go unseen. We're talking about the potential of the new products for generating increased production efficiency in your plant. Faster cycle or shorter setup times, increased precision, machine flexibility, less direct labor input per part produced, all those and more will be subjects interpreted by STEEL's editors in an eight page section of our machine tool issue. The editors will help you know, a week before the shows open, what trends, developments, and equipment will mean the most to you. If you can't make it to Chicago, use the section to evaluate machine tool offerings for the competitive 1960s.

Here's a Capsule Guide . . .

. . . of what you'll see if you attend. The Machine Tool Exposition—1960, sponsored by The National Machine Tool Builders' Association, will have more than 1000 pieces of metalworking equipment going from dawn to dusk. Open only to NMTBA members, the exposition's theme is Modern Machine Tools = Production Efficiency.

At the Production Engineering Show, exhibitors will display, among other equipment, dies, jigs, gages, chucks, conveyors, clutches, and drives.

The Coliseum Machinery Show will be populated by companies that are not NMTBA members, and it will present foreign machine tools.

Go Informed . . .

While covering the shows in Chicago five years ago, Machine Tool Editor Bob Huber asked the first cab driver he met: "What's doing in the Windy City?"

The driver ticked off some plays, night club acts, and a big General Motors' show at Soldier Field. Answers to the question were similar throughout the first few days.

Along about midweek, one cabbie said: "There's the damndest, biggest show this town has ever seen. They got stuff in the Amphitheatre, the Coliseum, and out on Navy Pier. I'm carryin'

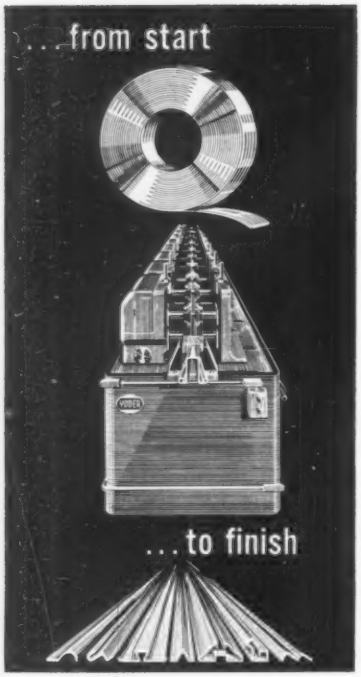
I suggest that STEEL's Panel of Economic Consultants consider this question:

_____

_____

Submit suggestions by Sept. 8, 1960

Address: Ed Service, Servicenter, STEEL, 1213 W. Third St., Cleveland 13, Ohio.



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Profits are available to you through the production of many shapes in metal... made with precision and economy on Yoder Cold Roll Forming Equipment.

Produce tubular, ornamental or structural shapes from a variety of metals in widths from a fraction of an inch up to 80 inches or more, and in stock up to ¾" thick. Your investment is comparatively modest, and with proven low operating costs, will give you one of the most profitable operations in your plant.

Experienced Yoder engineers will, without obligation, study your annual metal forming requirements. Many times they can point out that the installation of roll forming equipment would–even if operated only intermittently – soon justify its initial cost.

Send today for this comprehensive, 88-page illustrated text. It fully describes Cold Roll Forming Equipment, processes and products.

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YODER COLD ROLL FORMING MACHINES

guys to all three spots exclusive. Dump one load and pick up another. It's great!"

Bob asked the driver if he knew who was conducting the shows. The reply: "Yeah. It's a bunch of pipefitters."

If You Had a Chance . . .

. . . to ask 60 top economists the question you believe is the most significant one facing the U. S. or metalworking—what would it be? That's the problem faced by Associate Editor Bob Jaynes. Maybe you can help.

You may recall, last April, STEEL introduced a new business planning tool—the first in a series of semiannual forecasts by our Panel of Economic Consultants. After requesting the economists' views on eight widely used business indicators, Bob also asked for opinions on a problem which generally confronted business.

Here's where you come in. If it were up to you, what question would you pose to our panel? Just send along your suggestions, using the coupon on Page 5. The question cited most frequently will be submitted to the economists. You'll find it answered in our next survey, Oct. 3.

You Can Win $1000 This Month

There are five issues of STEEL this month — and one could help you win $1000 in our Usership Idea of the Month Contest.

Tell us, in 300 words or less, how you plan to USE an article or advertisement in this issue (or any other issue published this month—August, 1960) to help you accomplish an important personal or company objective. Be as specific as you can. If, in the opinion of the judges, yours is the best idea submitted—**you will win $500.**

There's more . . . You will win an additional $500 if you furnish written proof that you accomplished your objective. Proof must be submitted within six months after you are declared winner of STEEL's Usership Idea of the Month Award.

You may enter as many times as you wish. Please identify your letters as Usership entries. They will be judged by a committee of STEEL's editors. All letters become STEEL's property.

Send your entries to me, Ed Service, Servicenter, STEEL, 1213 W. Third St., Cleveland 13, Ohio. **Deadline for this month's contest is Oct. 1.**

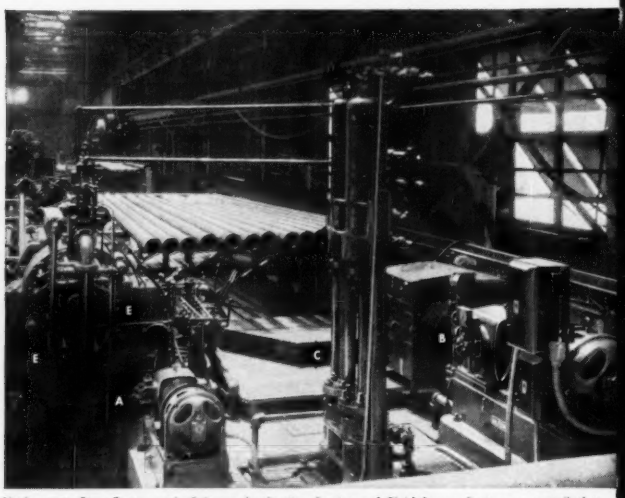
...Fluid Power news

REPORT NO. 11,803 TEST MORE PIPE—LONGER WITH OILGEAR

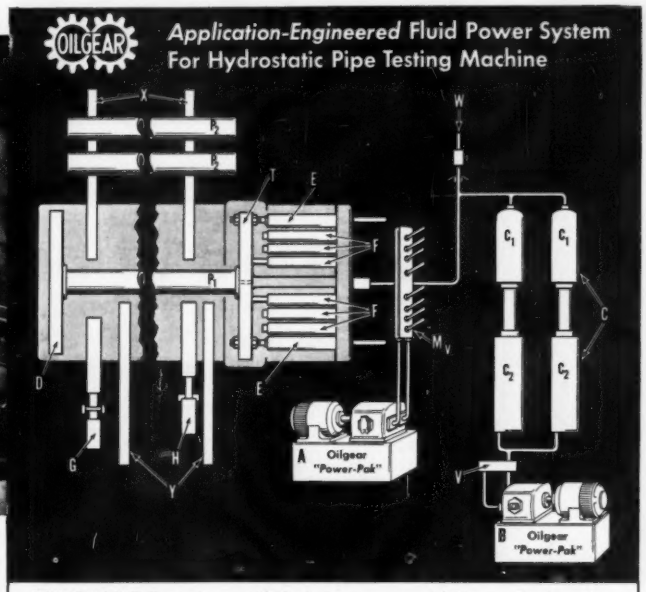
From Oilgear *Application-Engineering* Files

HOW OILGEAR SYSTEM POWERS PIPE TESTER EFFICIENTLY AFTER 23 TROUBLE-FREE YEARS

DATA: To supply power and control system for five functions of a hydrostatic pipe testing machine designed for a wide variety of pipe sizes and testing pressures ranging up to 6000 psi. Linear drives and controls were needed to: *1.* Actuate jaw-type clamps to hold and prevent pipe from buckling. *2.* Traverse testing head rapidly to and from testing position. *3.* Hold testing head against pipe under testing pressures. *4.* Actuate "knockout" arms to eject tested pipe from machine. *5.* Actuate an intensifier to boost water used for testing from city pressure to any selected testing pressure up to 6000 psi. *Specific Operating Requirements:* Simple, safe, dependable; capable of continuous, 'round-the-clock operation, 6 days per week in highly humid atmosphere; cycle rapidly for economical production; require a minimum of maintenance to prevent costly, line-stopping downtime; must be compact to conserve valuable floor space, economical in the use of electrical power.



Hydrostatic Pipe Tester with *Oilgear Application-Engineered Fluid Power System* as installed in 1937, and operating continuously since that time. Oilgear "Power-Paks" (A,B), Intensifier (C), Rapid Traverse Testing Head Cylinders (E) are indicated by arrows. Manifold and Control Valves at operator's station (M_V in drawing) are clearly visible, as are the direct-reading, operating pressure gages on the "Power-Paks." Testing pressures are quickly preset with a small handwheel on "Power-Pak" (B)—not visible. Pipe to be tested rolls directly from pre-testing storage racks, at right, directly into the machine.



HOW IT WORKS: Pipe to be tested (P_2) rolls from storage rack (X) into cradle of machine between Testing Head (T) and Tail Carriage (D). Testing Head (T) is moved forward quickly by Double-Acting Cylinders (E). Clamping Jaws actuated by Cylinder (G) grip the pipe along its length to prevent buckling. Pipe (P_1) is pre-filled with water at city pressure (W). Single-Acting Test Head Holding Cylinders (F) move up in matching pairs—2, 4, 6, 8, 10, or all 12 can be selected—depending on pipe size and testing pressure to hold Testing Head (T) against Pipe (P_1) and Tail Carriage (D). Movement of cylinders (E, F, G, H) are all controlled by valves mounted on Manifold (M_V) which direct fluid flow from Oilgear "Power-Pak" (A). Water at preselected test pressure from Intensifier (C) then exerts pressure on Pipe (P_1). Oilgear "Power-Pak" (B) supplies *Fluid Power* through Valve (V) to actuate Hydraulic Intensifier Cylinders (C_2) increasing pressure in Water Cylinders (C_1) to any desired pressure up to 6000 psi. After pipe is inspected, intensifier pressure is released, Testing Head (T) is rapidly retracted, and Knockout Cylinder (H) actuates mechanism to eject tested pipe onto rack (Y). Machine is then ready to start a new test cycle.

SOLUTION: An *Oilgear Application-Engineered System* consisting of two Oilgear Heavy-Duty "*Power-Paks*," Directional Control Valves, and "Custom-Quality" Cylinders. Each "*Power-Pak*" uses an Oilgear Heavy-Duty One-Way Variable Displacement Radial Rolling Piston Pump with automatic pressure unloading control to reduce pump stroke when holding a preset pressure indefinitely; eliminate excessive heating and power loss; reduce electrical power input requirements. Oilgear Pumps contain integral auxiliary systems for pilot, supercharge, cooling and filtering . . . with constant pressure and flood self-lubrication, conservatively loaded anti-friction bearings, and large internal passages—mechanical and hydraulic friction is reduced to a minimum for high efficiency . . . virtually guaranteeing a long, trouble-free, maintenance-free life.

USER REPORTED IN 1938—"*. . . after one year of operation we have nothing but the highest praise for the Oilgear Equipment on this pipe tester.*"

USER REPORTS IN 1960—"*This machine has given us years of trouble-free service, operating around the clock six days a week . . . maintenance has been at a minimum, with occasional changes in intensifier packings, as would be expected in normal operation . . . performance has been completely satisfactory.*"

With Oilgear Heavy-Duty System Components designed for thousands of hours of continuous service at full rated load, savings are compounded with every hour of uninterrupted performance. That's why machinery and equipment manufacturers and *their* customers say . . .
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... HOT

Temperature in this stainless steel rotary salt dryer will be 1600°F from combustion gases. It's used to demoisturize salt, one step in making high octane gas. C. O. Bartlett & Snow was the fabricator. They chose stainless steel because of its outstanding high temperature strength and resistance to high temperature oxidation.

COLD...

—443°F is only 16.4 degrees above absolute zero. That's one reason stainless steel is used in this heat transfer unit that helps simulate outer space conditions of near absolute zero temperature and one-billionth of an atmosphere. The all-stainless unit is named "PLATE-COIL," manufactured by Tranter Manufacturing, Inc., Lansing, Michigan.

This mark tells you a product is made of modern, dependable Steel.

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No material can match stainless steel's versatility. Stainless steel offers designers and fabricators a unique combination of properties: superior strength, extraordinary corrosion resistance to an enormous variety of reagents, outstanding high temperature properties, and appearance. It is easily fabricated and, because stainless steel lasts longer, actually costs less in the long run. If you have a selection or delivery problem, ask your USS representative or nearest steel service center.

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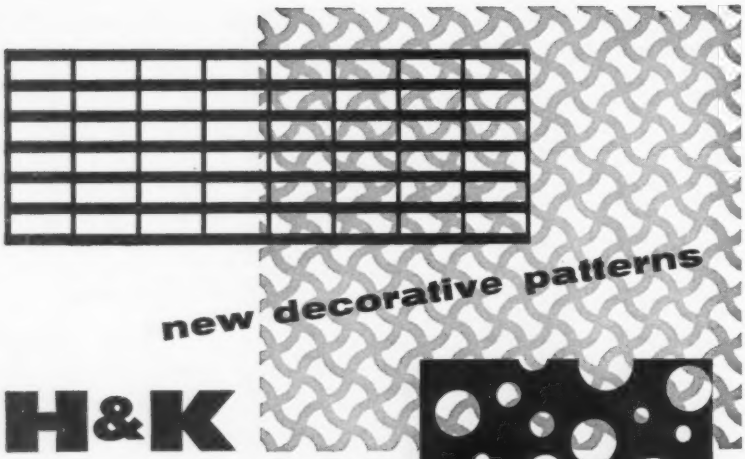

new decorative patterns

H&K
perforated materials

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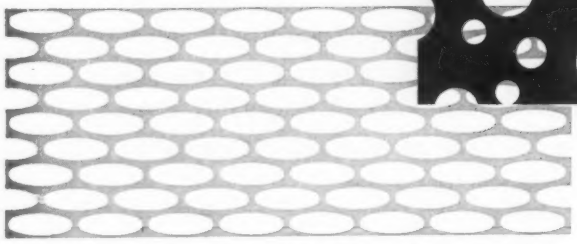
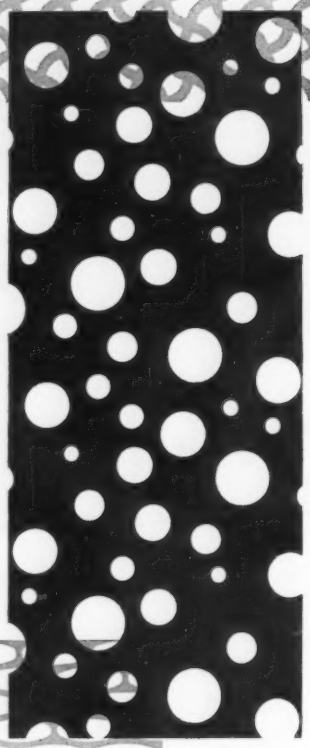
And there is also a vast selection of additional patterns and open areas which can be custom fabricated from existing dies. H & K can perforate practically any material. May we put our more than 75 years of experience to work for you?





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CALENDAR
OF MEETINGS

Sept. 3-4, American Machine Tool Distributors Association: Annual meeting, LaSalle Hotel, Chicago. Association's address: 1900 Arch St., Philadelphia 3, Pa. General manager: James C. Kelley.

Sept. 6-16, National Machine Tool Builders' Association: The Machine Tool Exposition—1960, International Amphitheatre, Chicago. Information: Clapp & Poliak Inc., 341 Madison Ave., New York 17, N. Y.

Sept. 6-16, Production Engineering Show: Navy Pier, Chicago. Information: Clapp & Poliak Inc., 341 Madison Ave., New York 17, N. Y.

Sept. 7-9, American Society of Mechanical Engineers: Instruments and regulators conference, Massachusetts Institute of Technology, Cambridge, Mass. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: O. B. Schier.

Sept. 7-15, Coliseum Machinery Show: Coliseum, Chicago. Information: A. Byron Perkins & Associates, 2807 Sunset Blvd., Los Angeles 26, Calif.

Sept. 12-13, Industrial Truck Association: Fall meeting, Cavalier Club, Virginia Beach, Va. Information: Hanson & Shea Inc., 1 Gateway Center, Pittsburgh 22, Pa.

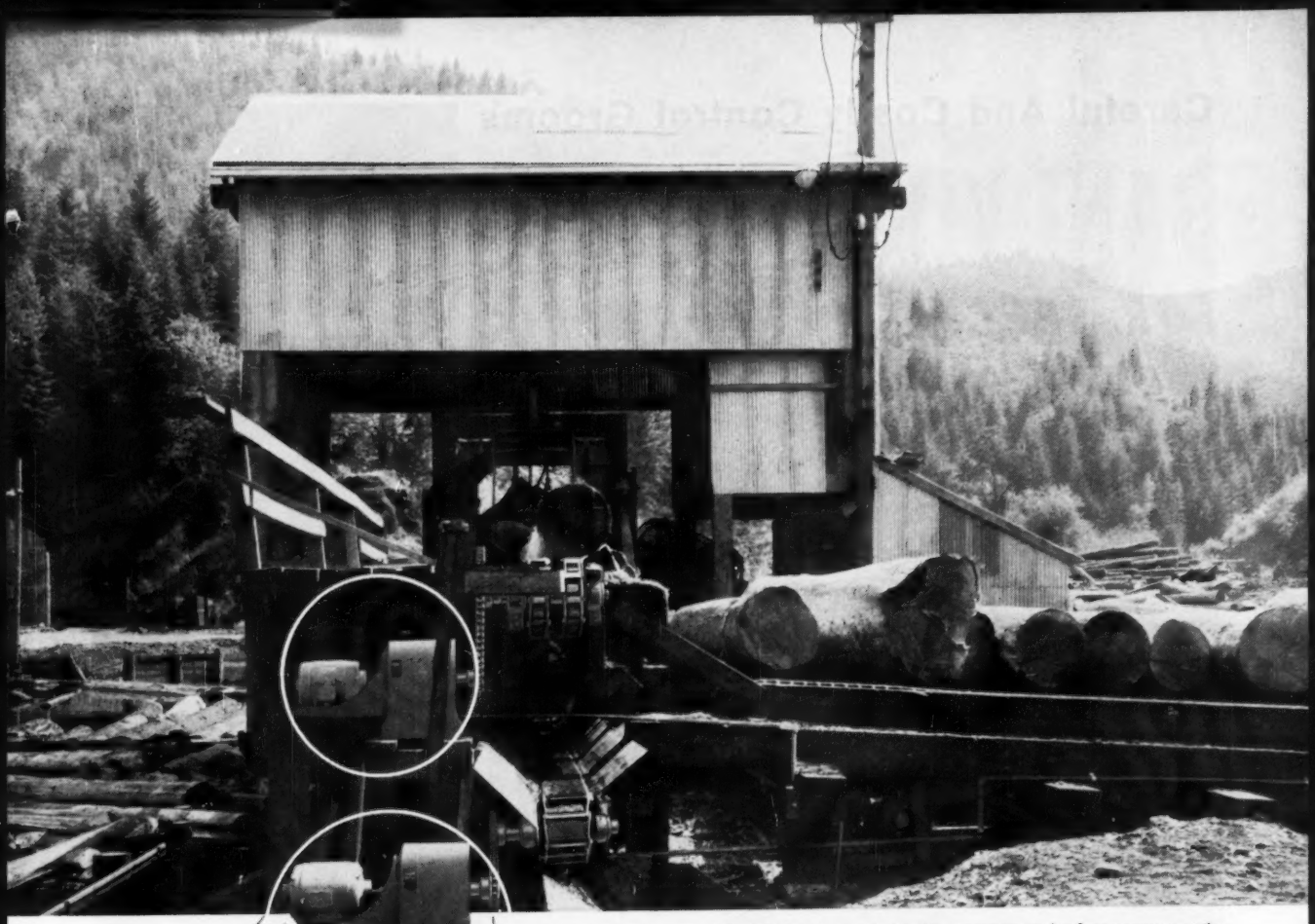
Sept. 12-15, Society of Automotive Engineers Inc.: National farm, construction, and industrial machinery meeting; production forum; and engineering display, Milwaukee Auditorium, Milwaukee. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: John A. C. Warner.

Sept. 13-15, American Chemical Society: Fall meeting and exhibit, Statler-Hilton Hotel, New York. Society's address: 1155 16th St. N.W., Washington 6, D. C. Executive secretary: Alden H. Emery.

Sept. 13-16, Electronic Industries Association: Fall meeting, French Lick-Sheraton Hotel, French Lick, Ind. Association's address: 1721 DeSales St. N.W., Washington 6, D. C. Secretary: James D. Secrest.

Sept. 14-15, American Die Casting Institute: Annual meeting, Edgewater Beach Hotel, Chicago. Institute's address: 366 Madison Ave., New York 17, N. Y. Secretary: David Laine.

Sept. 14-16, National Industrial Conference Board Inc.: General session for all associates on marketing, Waldorf-Astoria Hotel, New York. Board's address: 460 Park Ave., New York 22, N. Y. Secretary: Herbert S. Briggs.



FALK Motoreducers driving log conveyor and refuse conveyor at the modern mill of The Bohemia Lumber Company, Culp Creek, Oregon.

FALK *all-steel* Motoreducers give you longer service life

Whether your load conditions are normal or heavy, the extra rigidity of all-steel construction (more than twice that of cast iron) maintains better alignment of revolving elements under load...a vital factor in prolonging the service life of gears and bearings.

And if your installations are subject to shock loads, or accidental external impacts, you're way ahead when you install Falk All-Steel Motoreducers. These rugged units do not destroy themselves by tearing off their feet under jamming overloads, nor are their housings subject to cracks which both dissipate the vital lubricant supply and allow revolving elements to get out of alignment.

All-steel construction is one of the built-in extras that you get in Falk Motoreducers. Others include: (1) inherently stronger gear teeth (by AGMA standards), thanks to exclusive Falk extra-depth, high pressure angle helical gears; (2) maximum mechanical efficiency (98½% per gear mesh, under full load); (3) your choice of standard units (horizontal, vertical or right angle) to fit your precise requirements.

HORSEPOWER RANGE: to 75 hp . . . STANDARD OUTPUT SPEEDS: 780 rpm (high) to 1.2 rpm (low).

Prompt delivery from distributor stocks, or from warehouse or factory. Ask your Falk Representative or Authorized Falk Distributor for ***Bulletin 3100.***

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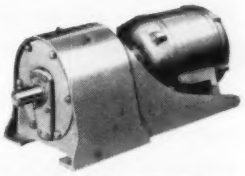
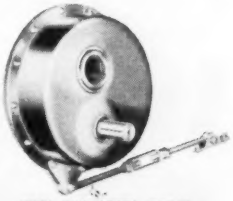


THE FALK ALL-MOTOR MOTOREDUCER
...the original All-Motor unit



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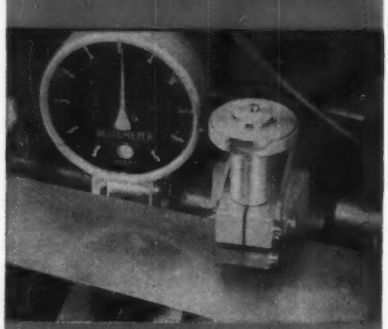

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For special physical properties plus accurate and uniform flatness, straightness, width, gauge and edge finish, specify Sandvik. Wide variety of qualities and sizes in stock plus local Sandvik facilities for custom-processing and finishing to your requirements. Send for free brochure.

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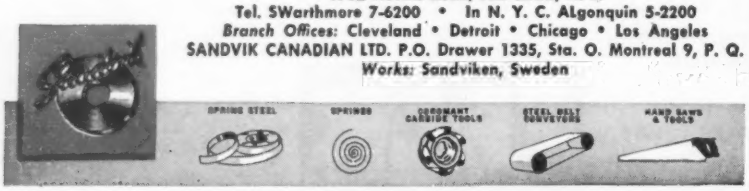

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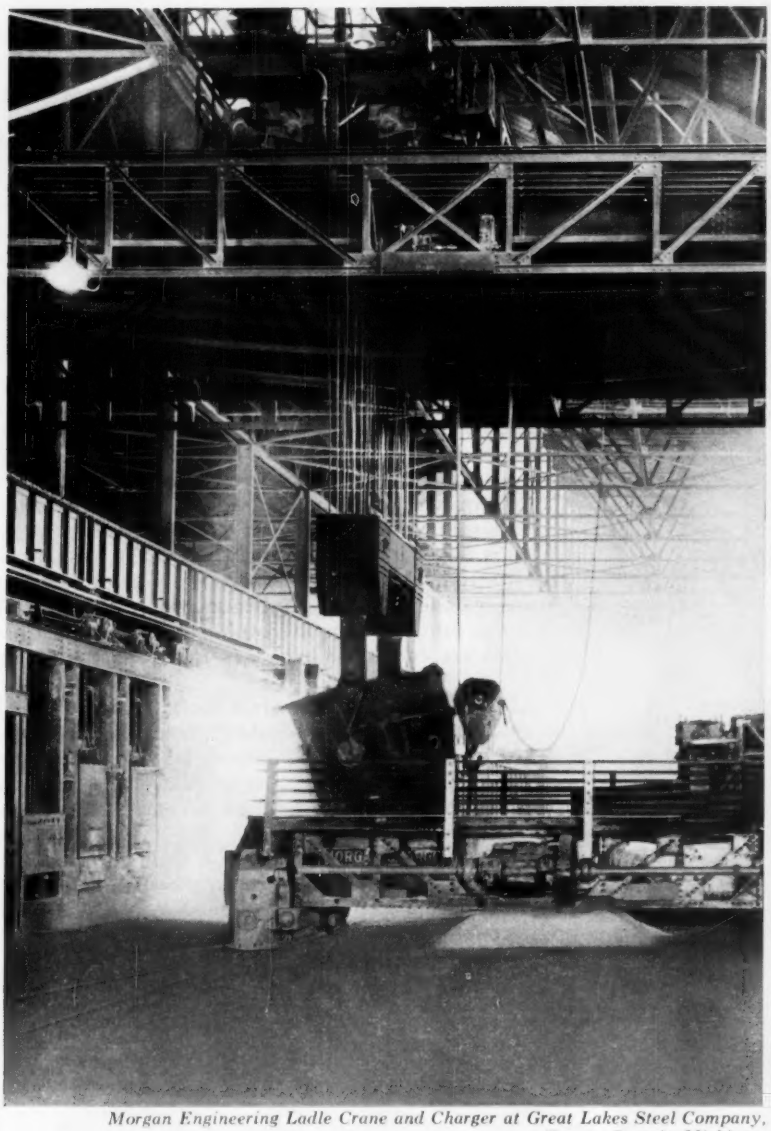
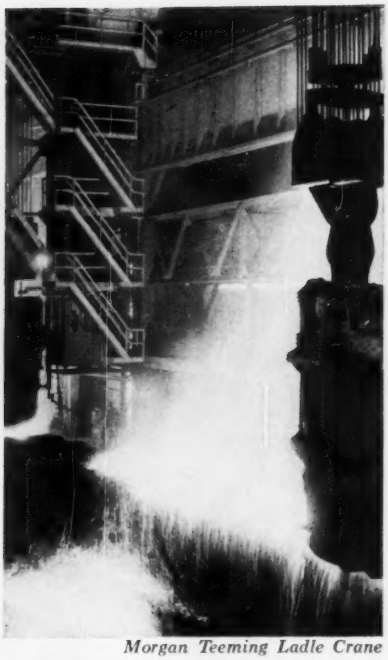
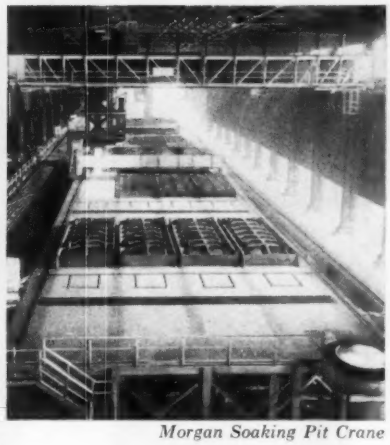


Morgan Engineering Ladle Crane and Charger at Great Lakes Steel Company, Ecorse, Detroit, Michigan



Morgan Teeming Ladle Crane



Morgan Soaking Pit Crane

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NEW MORGAN CRANES SUPPLEMENT THE OLD TO BOOST OUTPUT

From scrap to finished steel, Morgan Engineering cranes and chargers keep metal on the move. Having served them faithfully in past years, Morgan equipment was again selected by Great Lakes Steel for their latest expansion program.

Where your metal handling calls for top reliability to keep production flowing, low operating and upkeep costs to keep profits up, call for a Morgan representative. He'll advise you on the most economical equipment for your purposes.

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REPUBLIC ELECTRUNITE MECHANICAL TUBING

Republic's tube making know-how and fabricating facilities combined to solve a tough problem for the Kuhlman Electric Company, Birmingham, Michigan.

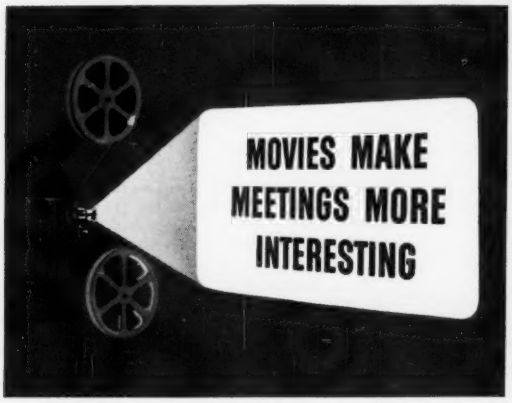
Kuhlman engineers wanted a material to meet the designs of the new Kuhlman "Quick-Grip" H.V. transformer bushing that would reduce radio noise without oil. They preferred the part supplied as a finished product.

A bushing sleeve made of Republic ELECTRUNITE Carbon Steel Mechanical Tubing, 2⅜" O.D., 10-gage, was the answer. The sleeve is approximately 3" long and has a chamfer on one end. Holes are punched on circumference, and the other end of the tubing is expanded. Coarse threads are cut in the expanded metal on an automatic screw machine.

This is a typical example of the flexibilities in fabrication of ELECTRUNITE. And Republic's Steel and Tubes Division has the facilities, equipment, and "know-how" to fabricate all grades and types of ELECTRUNITE carbon and stainless steel tubing into whatever shapes your product requires.

ELECTRUNITE is available in a wide range of sizes, gages, and wall thicknesses in both carbon and stainless steel. Call your Republic representative. Or, write direct. Use coupon below.

The Kuhlman "Quick Grip" H.V. sleeve, made of Republic ELECTRUNITE Mechanical Tubing, is a feature of the K-E Kuhlman Transformer, engineered and manufactured by the Kuhlman Electric Company, Birmingham, Michigan.



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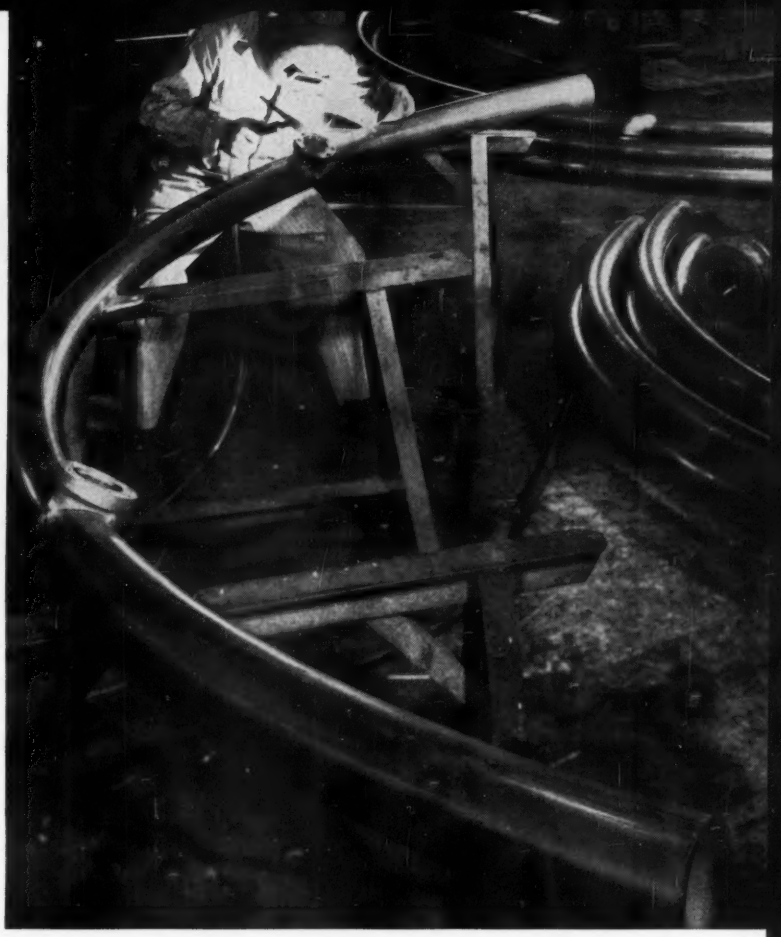
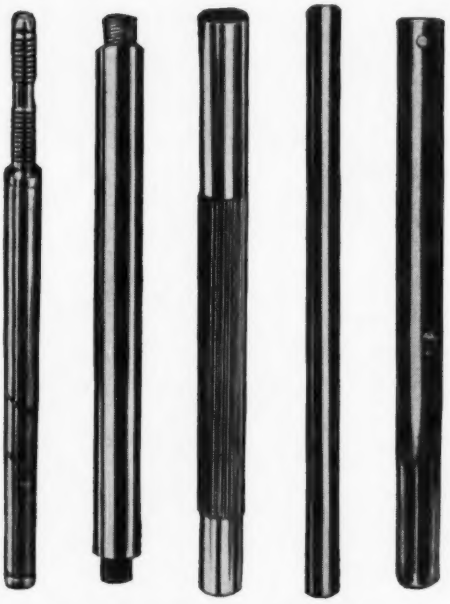


REPUBLIC ELECTRUNITE STAINLESS STEEL TUBING, Type 304, 4½″ O.D., was used to fabricate corona rings for a powerful East Coast Navy Radio Station. Despite the rather severe bend of the 15- and 20-foot rings, the fabricator reported no trouble whatsoever. The rings were made in three sections. ELECTRUNITE was bent to the correct radius. Three lugs were welded to each section. The ends were flared for the insertion of a plug used at the erection site to assemble the unit and suspend it from towers. ELECTRUNITE Stainless Steel Tubing and Pipe are available in most A.I.S.I. analyses from ⅜″ O.D. to 5″ O.D. Send for data.



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Now Bethlehem forges every hardened steel roll from vacuum-degassed steel!

Bethlehem vacuum-degassed steel minimizes the hazard of roll breakage

Pint size, king size, every in-between size. Now Bethlehem forges *every* hardened steel roll from vacuum-degassed steel.

Pioneer in "vacuum casting"

Bethlehem pioneered the development and use of vacuum-degassed ingots for highly stressed applications in the electric power, atomic energy, and other industries.

Our advanced steel-pouring techniques now permit us to pour molten steel from a furnace ladle to a secondary ladle within a vacuum chamber, and thereby remove harmful gases (we can also pour directly into a mold in the vacuum chamber). The secondary ladle is then taken out of the chamber and ingots of suitable size for hardened steel rolls can be cast under a blanket of inert gas.

Less gas means sounder steel

Because the vacuum-casting method reduces the volume of hydrogen and other gases, the steel is sounder, tougher, and cleaner than air-cast steel. It is this greater internal soundness which reduces the hazard of roll breakage.

Over 350 rolls now in service

In the past several years, we've produced and shipped over 350 large, vacuum-degassed hardened steel rolls. The outstanding performance of these rolls confirms our own production experience, which clearly proves the superior soundness of vacuum-cast rolls as compared to air-cast rolls.

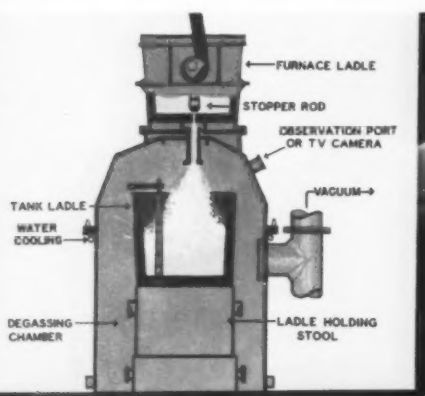
Fast delivery . . . no extra cost

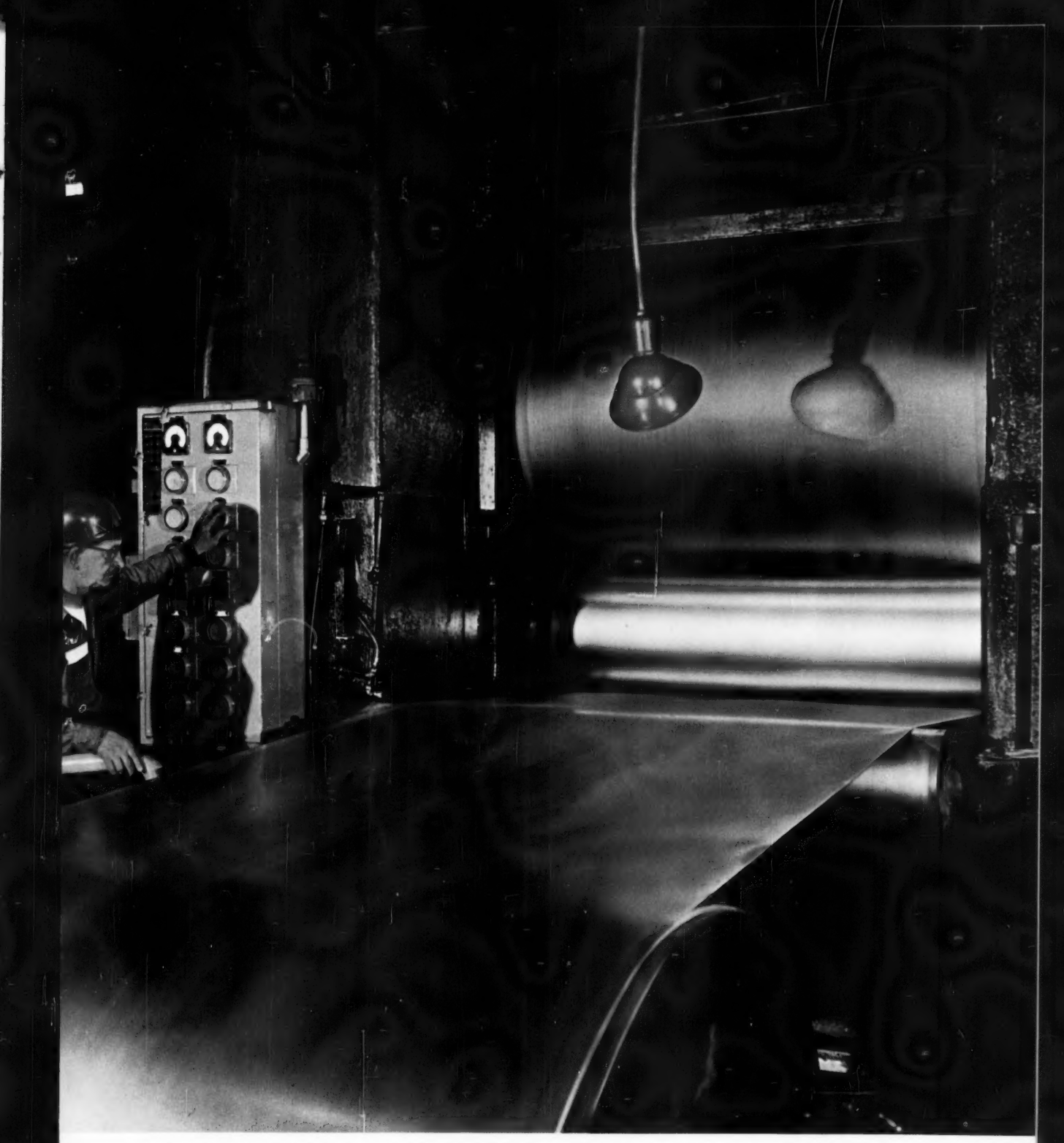
You have everything to gain (less roll breakage), nothing to lose (no price extra) by making your next purchase of hardened steel rolls Bethlehem vacuum-degassed rolls. Deliveries are excellent. Our sales offices are ready to give you the *whole* interesting story of this new Bethlehem development. Call or write the office nearest you today. Or write to us at Bethlehem, Pa.

STEEL IS TAPPED from the furnace into the furnace ladle. The furnace ladle is then attached to the vacuum tank, and the molten metal pours through a vacuum-tight seal into either a secondary ladle or a mold inside the degassing chamber. If poured into a ladle, ingots can be subsequently cast from this ladle under a blanket of inert gas.

TV TELLS HIM WHAT'S GOING ON. One TV camera peers inside the high-vacuum chamber into which the hot steel is gushing and shows the stream coming from the furnace ladle (top screen). Another camera, whose picture appears on the bottom screen, shows the action of the hot steel as it flows into either the secondary ladle or the mold set up inside the vacuum tank.

ULTRASONIC SOUND WAVES, pitched so high you can't hear them, penetrate every inch of the Bethlehem vacuum-degassed roll you see here. The waves relentlessly search out any possible inner discontinuities which, if present, would be indicated on the screen. When the Bethlehem inspector gives his OK, you can rely on the soundness of that roll.





BETHLEHEM VACUUM-DEGASSED ROLLS are made for every application—cold-rolling steel sheet, strip, tinplate, and non-ferrous metals. Every roll meets your specifications *exactly* on size, shape, hardness, and finish.

BETHLEHEM STEEL

BETHLEHEM STEEL

CHECKING EVERY DETAIL is more than a routine habit in the making of Bethlehem vacuum-degassed forged rolls. It's done with an extra measure of thoroughness, extra care—from the analysis of the steel to the critical inspection of the finished product.

These are the new symbols of quality for hardened-and-ground forged steel rolls

LOOK FOR THIS LABEL on the packing of the hardened steel rolls you buy. It's your guarantee that your rolls are forged from Bethlehem vacuum-degassed steel . . . steel that minimizes the hazard of roll breakage in your plant.

LOOK FOR THIS "V" STAMP on the ends of the rolls you buy. . . . "V" is for vacuum. You'll find this permanent identification on every Bethlehem roll from now on . . . because from now on Bethlehem forges hardened steel rolls *only* from vacuum-degassed steel.

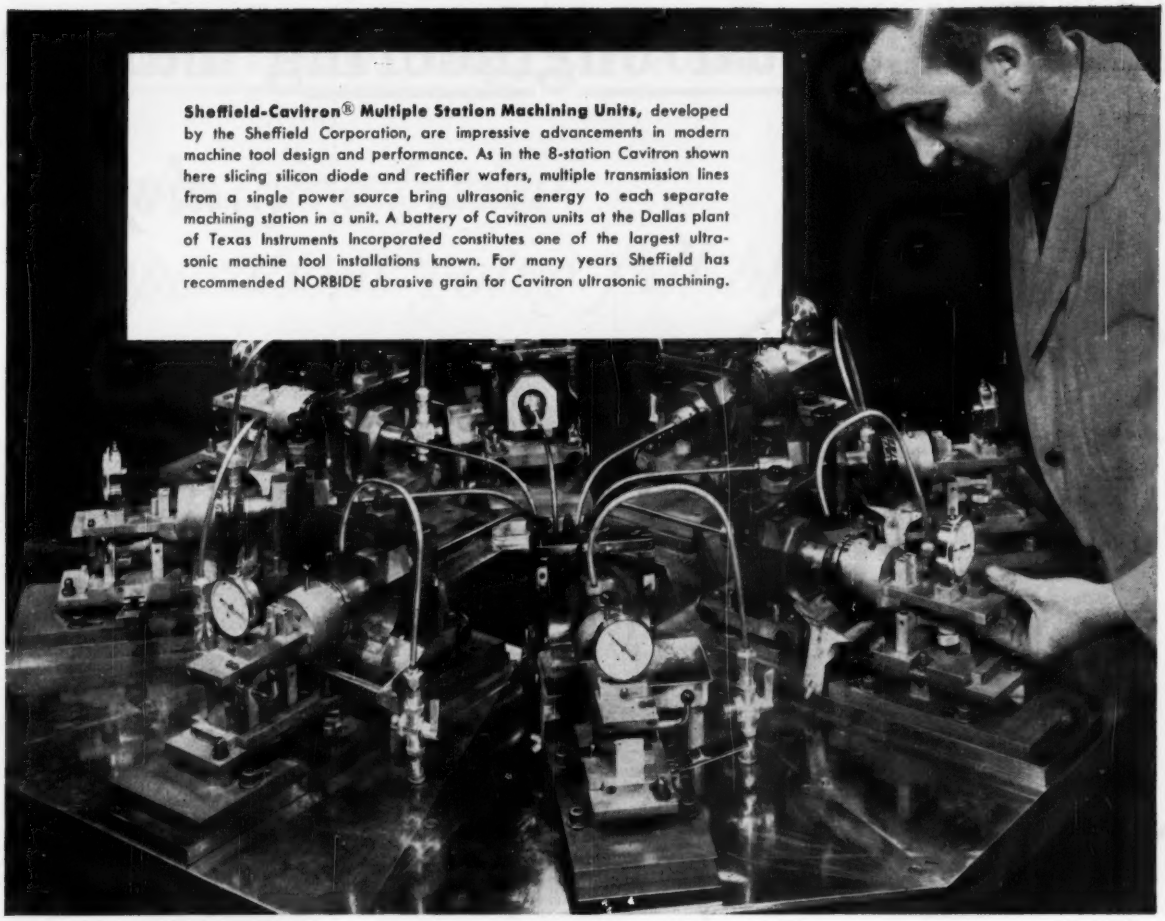
For strength
. . . economy
. . . versatility

Steel

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
Export Distributor Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL



Sheffield-Cavitron® Multiple Station Machining Units, developed by the Sheffield Corporation, are impressive advancements in modern machine tool design and performance. As in the 8-station Cavitron shown here slicing silicon diode and rectifier wafers, multiple transmission lines from a single power source bring ultrasonic energy to each separate machining station in a unit. A battery of Cavitron units at the Dallas plant of Texas Instruments Incorporated constitutes one of the largest ultrasonic machine tool installations known. For many years Sheffield has recommended NORBIDE abrasive grain for Cavitron ultrasonic machining.

FOR ULTRASONIC MACHINING . . .

the best abrasive – NORBIDE Boron Carbide is now even better!*

Keeping pace with the development of ultrasonic machining to bring high precision to more and more applications, NORBIDE boron carbide is preferred as the ideal cutting agent for these rapidly increasing operations.

And now new Norton manufacturing techniques have brought improvements to NORBIDE abrasive . . . which bring even more advantages to ultrasonic machining than ever before!

Always recognized as second only to diamonds in hardness, and as much more suitable than silicon carbide grain, NORBIDE boron carbide grain now has greater freedom from impurities.

This means more effective, longer lasting cutting power in each ounce of NORBIDE boron carbide.

Remember: ultrasonic machining is rapidly spreading its advantages throughout industry — metalworking, electronics, fine glass, laboratory ware, jewelry and many other manufacturing fields. Materials machined include a wide range of metals, ceramics, refractories, etc. Operations include slicing, shaping, slotting, engraving, multi-drilling, etc. In all applications, on all materials, NORBIDE boron carbide is the most dependable abrasive for high precision, product quality and economy.

Your Norton Man can assist you in obtaining facts about how ultrasonic machining with NORBIDE abrasive can benefit your production. See your Norton Distributor or write to NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

*Trade Mark Reg. U.S. Pat. Off. and Foreign Countries

NORTON
BORON CARBIDE

G-404

75 years of . . . **Making better products . . . to make your products better**

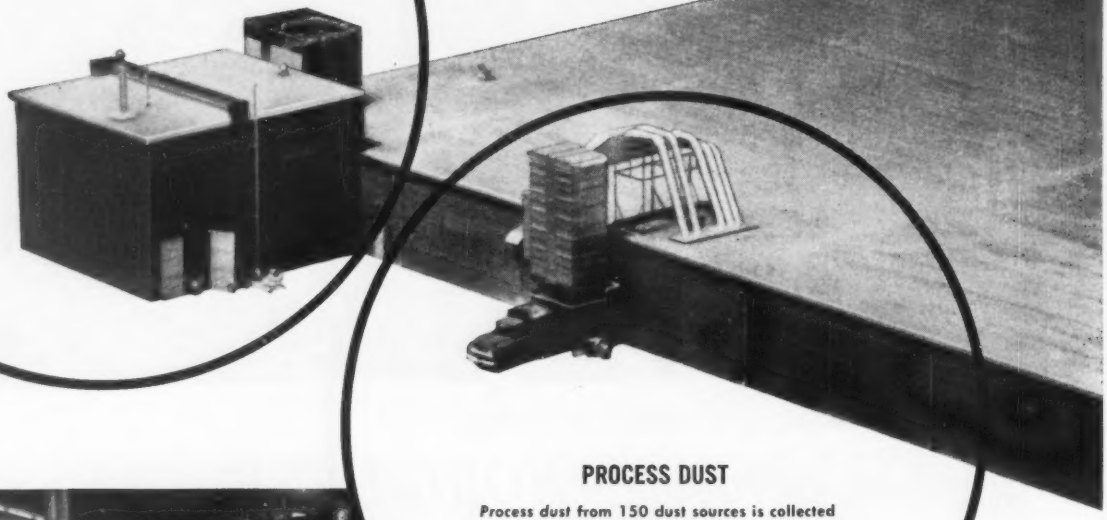
NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Electro-Chemicals — **BEHR-MANNING DIVISION:** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

AAF clean-air engineering makes

...despite

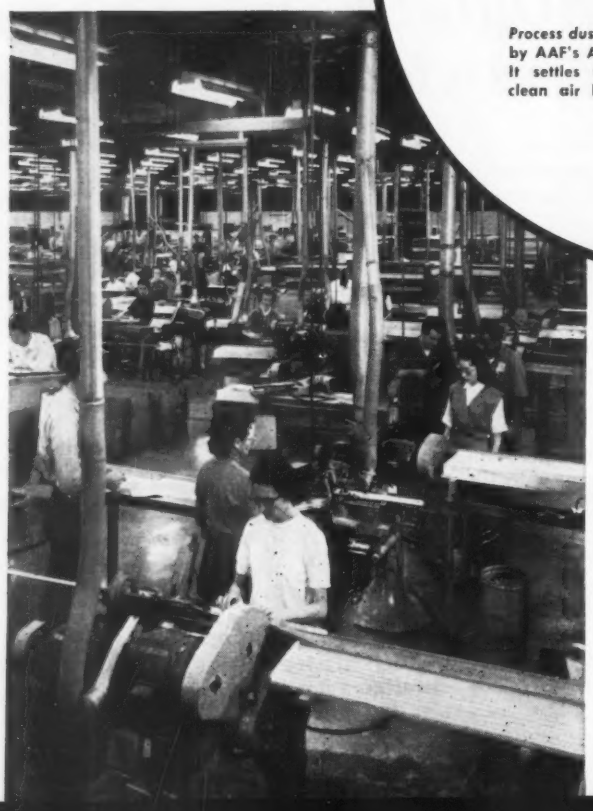
ATMOSPHERIC DUST

Atmospheric dust is taken out of the intake air by AAF's Roll-O-Matic air filter located in the air conditioning apparatus room. Recirculated ventilation air also is continuously cleaned by the Roll-O-Matic.



PROCESS DUST

Process dust from 150 dust sources is collected by AAF's AMERjet reverse jet fabric collector. It settles the dust in its hoppers, returns clean air back through the central system.



Interior of plant showing multitude of dust-producing operations.

air conditioning practical here...

150 dust-producing operations going full blast!

PRATT, READ & COMPANY MANUFACTURING PLANT, Central, South Carolina; General Contractor: Daniel Construction Company, Greenville, S. C.; Mechanical Contractor: Davis Mechanical Contractors, Inc., Greenville.
PRATT, READ & CO., INC.

AAF system permits air recirculation, slashes heating-cooling, maintenance costs

Pratt, Read & Company, manufacturers of piano keys and actions, wanted its new Central, South Carolina plant to be air conditioned. Reasons: better working environment for its people and improved quality of its products. Problem: the fact that 150 dust-producing operations would be going at full throttle during the working day.

AAF's air engineering knowhow, plus its complete line of air-cleaning products (for both atmospheric and process dust) made air conditioning practical by providing for money-saving recirculation of air. The savings: plenty—lower heating costs in winter, vastly lower cooling costs in summer, and a big savings in plant cleaning costs.

For a look at what we mean by a really *complete* line of equipment, call your local AAF representative or write direct for Bulletin 518. Address: Mr. Robert Moore, American Air Filter Company, Inc., 443 Central Ave., Louisville, Ky.

AAF American Air Filter

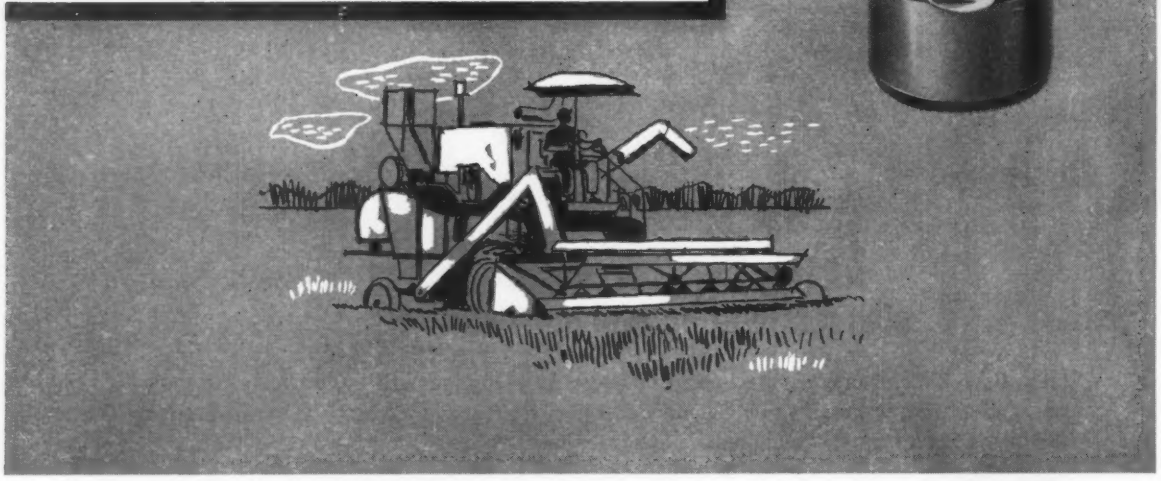
BETTER AIR IS OUR BUSINESS

two more cases where PARTS PRODUCED FROM provide excellent bearing properties

CASE HISTORY

MUELLER BRASS CO. 600 ALLOY screw machine product used in heavy duty farm equipment

This heavy duty planetary pinion shaft, made as a screw part from tough "600" series bearing alloy, was the answer to a continuing wear problem encountered in the driving mechanism of heavy-duty farm equipment and big trucks. The part is machine produced to exacting tolerances and all necessary finishing operations are done by Mueller Brass Co. so the pinion shaft is ready for installation when received. Since "600" alloy parts have been installed, no operating failures have been reported and the shafts have proved far superior to the material formerly used.



MUELLER BRASS CO. ANALYSIS SERVICE

You get sound, unbiased advice on the one best method of making your parts because Mueller Brass Co. is the only fabricator in the country offering all these methods of production. An experienced Methods Analysis Department has at its command a complete knowledge of the advantages and limitations of each production process. This unique technical service is your assurance of getting the best product at the best price . . . made the one best way!

COLD-PREST IMPACT EXTRUSIONS

PLASTIC INJECTION MOLDING

MUELLER BRASS CO.

MUELLER BRASS CO. 600 ALLOY

and maximum wear resistance in tough applications

CASE HISTORY

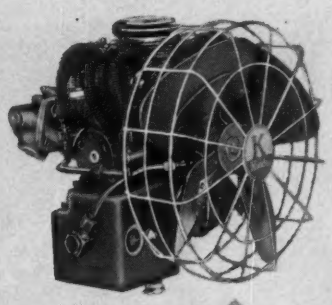
MUELLER BRASS CO. 600 ALLOY forgings used in aviation air compressors

Analyzing the job requirements of Walter Kidde & Company, Inc., for a main driving cam component to be installed in a reciprocating type of aircraft air compressor, Mueller Brass Co. Methods Analysis Engineers decided on a forging fabricated from "600" alloy as the most practical method of production. Since the cam forms the prime component of the driving mechanism, it must have good bearing wear surfaces and because the compressors are used in the aviation industry, the cams must be completely dependable. The close grained, strong forging that resists combination compressive and tensile stresses was the answer.

A typical compressor takes in ambient air and compresses it to 3000 psi or higher. This high pressure air is stored in metal or fiberglas containers until needed for actuation of pneumatic system components such as solenoid control valves, brake valves, manual control valves or actuators. These and other pneumatic units retract the entrance door, operate landing gear, wheel brakes, nose wheel steering systems, propeller brakes or perform other functions.

Aircraft in which Kidde compressors are installed include the Boeing 707, the Douglas DC-8, the Lockheed Electra, the Fairchild F-27 and various military aircraft.

Mueller Brass Co. produces press, hammer or cored forgings of any practical shape from a few ounces to 150 lbs. in brass, bronze, aluminum and magnesium in 27 standard, as well as special, alloys.

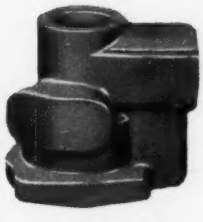


Aircraft air compressor equipped with hydraulic drive delivers air compressed to 3000 psi at the rate of 6 cfm.

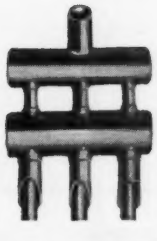
This yoke forging is lightweight, yet strong; has excellent bearing wear surfaces.

Forging is part of the main cam, the prime component of a modified Scotch-type yoke, which is the piston driving mechanism in the air compressor.

POWDERED METAL PARTS



SAND CASTINGS



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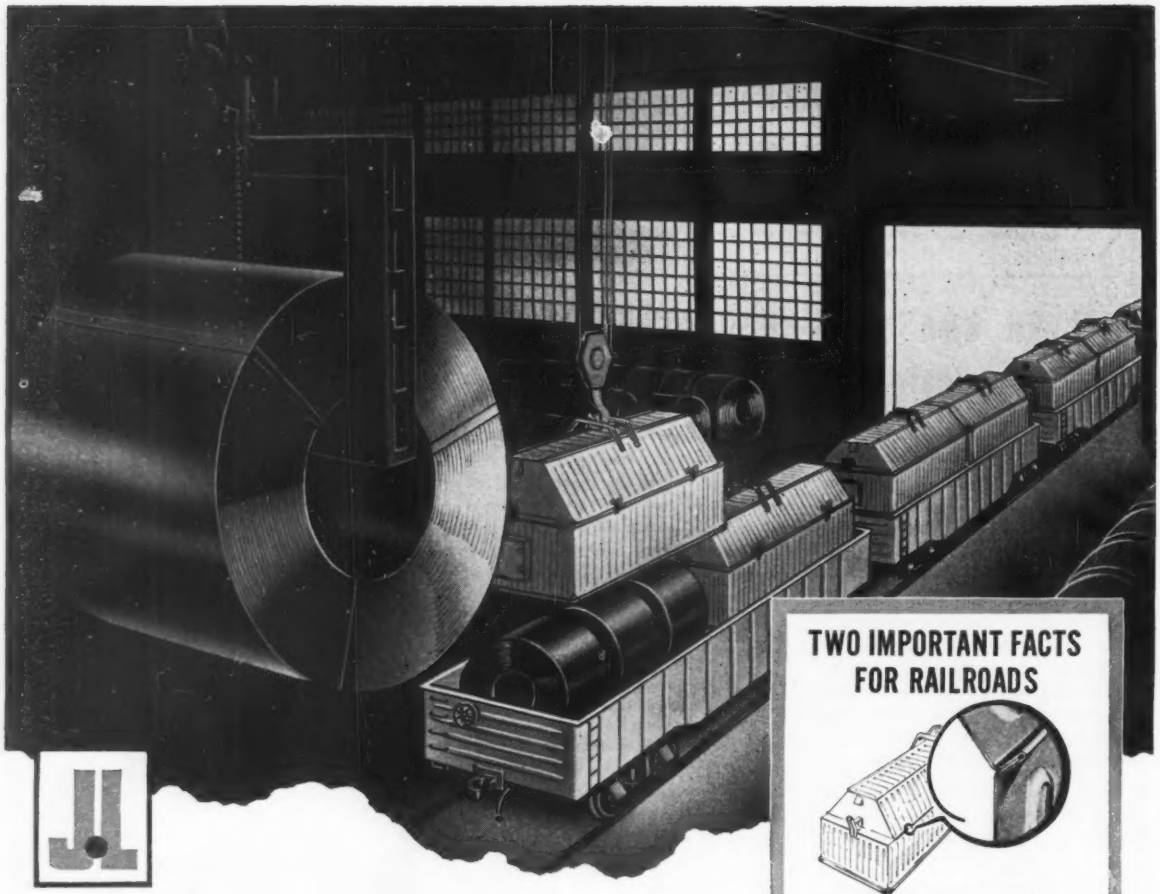
MADE IN U.S.A. TO THE STANDARDS OF AMERICAN INDUSTRY

Write today for free technical literature on any one or all of the seven fabricating methods.

286



YOCAR HOODS HELP J & L SOLVE SHIPPING PROBLEMS

Use of Yocar hoods on shipments of high quality steel coils provides savings of "$25 to $30" per car loading according to JONES & LAUGHLIN STEEL CORPORATION, ALIQUIPPA WORKS DIVISION, ALIQUIPPA, PA.

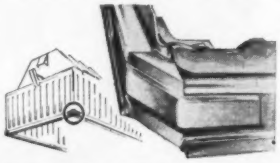
Costly dunnage and paper wrappings are eliminated — damage claims show drastic reduction — and the perfectly balanced YOCAR HOODS permit easy positioning with minimum manpower. Positive protection from weather, dirt and vandalism is also provided.

Helping you **SHIP SAFELY AT A SAVINGS** is YOCAR'S goal. Why not do something about your profit-reducing shipping problems? Specify YOCAR protection next time you ship by rail.

OTHER YOCAR SAFETY DEVICES	**Safe-Cargo Anchor Rails for piggy-back trailers** **Yocar 3-section Removable Roofs**	**Yocar Safe-Cargo Econo-Guard increases car wall life** **RoLLoK Movable Bulkheads**

TWO IMPORTANT FACTS FOR RAILROADS

SEAM-LOCK construction eliminates upper welded seams, where water accumulates, insuring weather-tight protection throughout the hood life. Added strength to the entire hood is achieved due to the rigidity and durability of SEAM-LOCK'S design.



CORNER-STRENGTH . . . A new corner construction makes YOCAR hoods the strongest and best constructed hoods available today. Double backing on each corner insures longer service life, for it is here that gondola hoods take the most constant beating from humping and shifting in transit.

Send for new catalog today and see how Yocar can help you solve your shipping problems.

YOCAR

YOUNGSTOWN STEEL CAR CORPORATION • NILES, OHIO

THIS STEELMARK

IDENTIFIES PRODUCTS MADE

OF MODERN RELIABLE STEELS

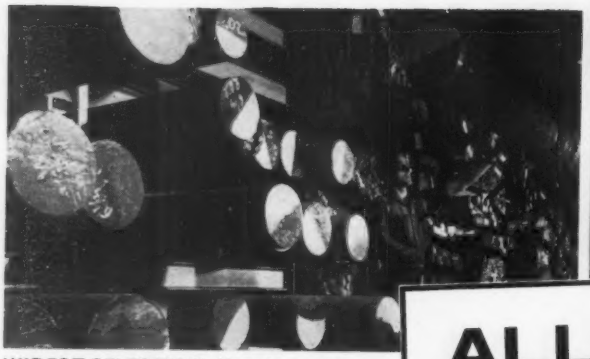
Use This Mark On Your Products

...Look For It When You Buy

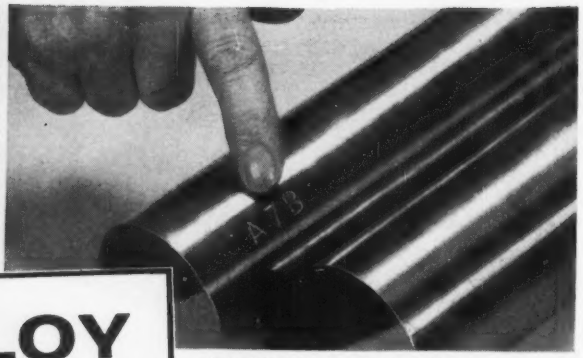
WYCKOFF STEEL COMPANY SPECIALISTS IN QUALITY COLD FINISHED STEELS FOR OVER 40 YEARS

Pittsburgh 30, Pa.

WORKS: AMBRIDGE, PA., CHICAGO, ILL., NEWARK, N. J., PUTNAM, CONN.



WIDEST SELECTION—You choose from the nation's largest and most diversified alloy steel stocks at Ryerson—available to meet even your largest requirements.



8-STEP CERTIFICATION—Our unique 8-Step Certified Alloy Plan assures test-proven quality and predictable performance every time . . . guides heat-treatment . . . cuts reject loss.

ALLOY STEELS

in Stock at Ryerson

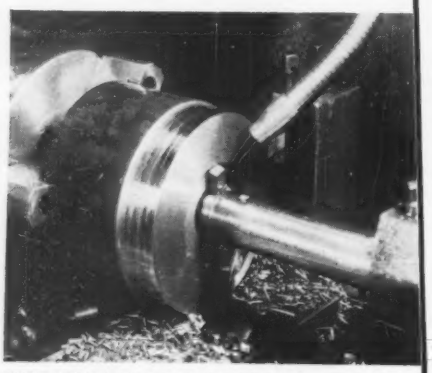
BARS

Hot rolled and cold finished

Low Carbon Case Hardening	4615/20
	E8615
	8620
	8620 leaded
	E9310
	Nitralloy
	135 modified
Heat-Treated Medium Carbon	4140
	4140 TG & P
	4140 leaded
	4147/50 leaded
	4340
	Rycrome®
	Rycrome TG & P
	Nikrome®
	Nitralloy
Medium Carbon Annealed Direct Hardening	4140
	4140 leaded
	4147
	4147/50 leaded
	4340
	E6150
	8647 leaded
Rycut Free Machining	Rycut® 20
	Rycut 40 and 50 annealed
	Rycut 50 modified annealed
	Rycut Heat-Treated

PLATES

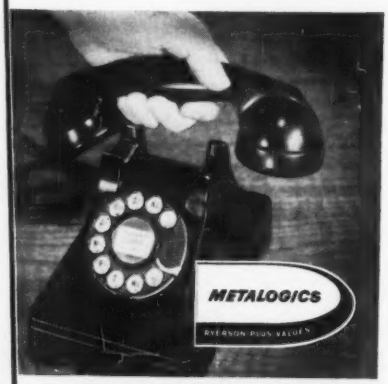
8620	T-1
E8615	Aircraft Quality
4140	4130 & E4130



WORLD'S FASTEST CUTTING . . . that's Ryerson's Rycut series of alloys (see listing). And Rycut heat-treated has carbon matched to bar size for best combination of machinability and strength.

TECHNICAL HELP—Your Ryerson representative is Metalogics-trained to suggest the best alloy for each application . . . steels to do the job faster, better—at less cost.

DEPENDABLE DELIVERY—Big-capacity facilities and an experienced staff with a service attitude assure quick delivery of any quantity—within hours if needed.



BE "METALOGICAL"—All the plus values of Ryerson service on alloy steel add up to the Ryerson science of giving you "optimum value for every purchasing dollar." So be "Metalogical"—call Ryerson.

METALOGICS
RYERSON PLUS VALUES

STEEL • ALUMINUM • PLASTICS • METALWORKING MACHINERY

RYERSON STEEL

Joseph T. Ryerson & Son, Inc., Member of the INLAND Steel Family

PLANT SERVICE CENTERS: BOSTON • BUFFALO • CHARLOTTE • CHICAGO • CINCINNATI • CLEVELAND • DALLAS • DETROIT • HOUSTON • INDIANAPOLIS
LOS ANGELES • MILWAUKEE • NEW YORK • PHILADELPHIA • PITTSBURGH • ST. LOUIS • SAN FRANCISCO • SEATTLE • SPOKANE • WALLINGFORD

How First Half Profits Stacked Up (or Failed to)

First National City Bank of New York compares the net income of 721 leading corporations:

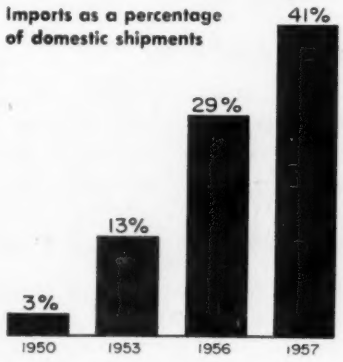
	% change in first half, '60 vs. '59	% Change in 2nd Quarter, '60 vs. '59
Iron & steel	−55%	−29%
Electrical equipment	− 7%	same
Machinery	−10%	+ 4%
Nonferrous metals	−20%	−20%
Other metal products	−22%	−13%
Autos & parts	−16%	− 5%
Other transportation equipment	+ 9%	same
Tire, rubber products	− 6%	− 5%
Cement, glass & stone	−14%	− 7%

In the Wake of the 'Newberg Affair' . . .

Other car divisions have been moved to take a closer look at their own supplier relationships to prevent—or halt—any abuses similar to those reported at Chrysler. Sol A. Dahn, a Detroit lawyer, Karl S. Horvath, former manager of a Chrysler stamping plant, and S. S. Schwartzberg of New York, are charging Chrysler Corp. with "gross mismanagement." Their lawsuit also named as defendants all of Chrysler's directors and 15 of the company's suppliers. Prudential Insurance Co., which has made substantial loans to Chrysler, says "as a matter of course" it is taking an interest in the stockholders' suit, but hasn't yet decided what, if anything, it will do.

Will U. S. Lose Another Industry?

If the current rate of increase in imports of wood screws continues, U. S. manufacturers could be out of business within the next three years, George P. Byrne Jr., legal counsel for several fastener manufacturers' associations is telling the Committee for Reciprocity Information. Nearly 1 million gross of foreign wood screws poured into the U. S. each month last year—vs. about 600,000 gross per month in 1958 and only 776 gross in 1949.



Chicago PAs Report Sidewise Movement

The July survey of the Purchasing Agents Association of Chicago finds: Deliveries are rapid . . . prices are stable . . . inventories are being reduced . . . July production was seasonally lower than it was in June . . . order backlogs are steady . . . profit margins are narrowing . . . quality of purchased materials is improving.

Most Workers Get 9 Cent Wage Hikes

About 1.1 million workers were affected by major collective bargaining settlements concluded during the first quarter, Labor Department estimates re-

leased last week indicate. Of those workers, all but about 1 per cent will receive wage hikes during the first contract year. More than half the workers will get hikes of 9 to 11 cents an hour. About 17 per cent get 7 to 9 cent hikes, and 15 per cent get boosts of 17 cents an hour or more.

Porcelain Enamel Research House Opens

The Ferro Corp. research house, based on a system of modular or unitized components, opened 12 days ago in Northfield Center, just south of Cleveland. Rear view of the house (right) shows curtain wall sandwich panels—each 24 in. wide with a 2 in., foamed polystyrene core faced on both sides with porcelain-enameled steel—and the greenhouse solarium. The ceiling of the first floor consists of acoustical steel panels backed up by 2 in. of Fiberglas, sound absorbent, insulation. A new baseboard raceway wiring system (left) allows outlets to be installed anywhere in the room. The cover plate snaps off and wires are pressed into prongs on the back of the receptacle.

July Dividends Up

Cash dividend payments by corporations in July totaled $900 million—up $20 million from the year earlier month, reports the Commerce Department. Total cash dividends for the first seven months of this year ($7.5 billion) are 6 per cent greater than in the same period last year.

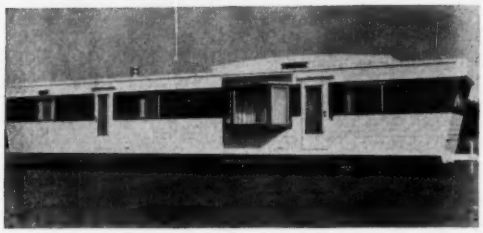
Many Industries Benefit from Swimming Pool Growth

Expect Americans to spend $1 billion this year for 85,000 swimming pools (vs. 1959 outlays of $750 million). So predicts National Swimming Pool Institute. The billion bucks is installed cost, including basic equipment such as ladders, diving boards, recirculating pumps, filters, and underwater lights. It doesn't include mounting outlays for such items as chemicals, cabanas, tables, chairs, umbrellas, pool toys, enclosures, lockers, benches, and baskets. And such outlays are huge since there are about 255,000 pools in the U. S. today.

Service Center Counters Price Trend

Although leading aluminum producers boosted the price of screw machine rods (2011) 2 cents a pound, Hawkridge Bros., New England distributor, says it will hold its price. "We believe it is high time the U. S. aluminum industry faced up to foreign competition and made the sacrifices necessary to keep its share of the total market," declares Edwin Hawkridge, president.

Mobile Home Notes



The current average price for mobile homes is $5000 . . . the 380 firms in the industry produced a record 108,770 mobile homes last year, plus 40,230 other trailers . . . More than 4 million persons live in 1.4 million mobile homes in the U. S. today . . . 37 per cent of mobile home residents are skilled workers; 20 per cent are military personnel; 18 per cent are professional people. So says Mobile Homes Manufacturers Association.

Want to Buy Surplus Vanadium?

The General Services Administration is offering, to the highest bidder, 4310 tons of lead vanadate ore, about 2950 tons of vanadate concentrates (beneficiated ore), and 35,350 lb of fused pentoxide (from which ferrovanadium, vanadium metal, and vanadium chemicals are made).

Two New 'Hot Cells' Go to Work

A Phillips Petroleum technician shows how tests can be carried out inside one of the two new hot cells that began operating last week at the Atomic Energy Commission's station near Idaho Falls, Idaho. Above the window is a telescoping shield assembly made from 2-in.-thick steel plates produced by U. S. Steel Corp.'s Geneva Works. Designed and built by H. K. Ferguson Co., the cells will be used to measure changes in atomic structure, tensile strength, or hardness of metals exposed to neutron bombardment. The larger cell has 4-ft-thick walls of high density concrete.

Underwater Mine to Open as Giant Dredging Job Nears

Caland Ore Co. Ltd. will mine 750,000 tons of high grade ore this year from below the bed of Steep Rock Lake in Ontario. Production will eventually reach 3 million tons. For the last five years, two 36-in. dredges (specially designed by Ellicott Machine Corp.) have been working around the clock to displace 160 million cubic yards of silt—enough to fill a line of 5-ton dump trucks extending two-and-one-half times around the world. The ore is slated for Inland Steel Co. furnaces.

India Gets Aluminum Fabricator

Hindustan Aluminum Corp. Ltd., a joint venture of Indian interests and Kaiser Aluminum & Chemical Corp., has received a license from the Indian government to build an aluminum fabricating facility. A mill capable of produc-

ing 15,000 metric tons of rolled, drawn, and extruded aluminum products annually is scheduled for completion in 1962. It's being built between New Delhi and Calcutta under the supervision of Kaiser Engineers Overseas Corp.

15 Gallons of Beer Per Person Means Jolly Big Metal Market

Per capita consumption of beer in the U. S. was 15.3 gallons last year—up 0.3 gallon from the 1958 figure. And more people drank their brew from cans. So the brewing industry consumed 901,127 short tons of steel and 2072 long tons of tin last year. So says the U. S. Brewers Foundation. The U. S. is the world's largest beer consumer (87 million barrels last year), with West Germany second (44 million), and the United Kingdom third.

Aluminum Exports Up; So are Imports

Crude aluminum exports in June were 49.1 million lb—up from 31.9 million lb in May. June exports of scrap equaled the May mark of 13.2 million lb. Imports of crude aluminum in June totaled 30 million lb, up from 22.8 million lb in May, and imports of semifabricated shapes reached 7.5 million lb in June, up from 6.6 million lb in May.

Straws in the Wind

Steel accounts for nearly 98 per cent of all metals used in making 300 different types of agricultural machinery and equipment . . . The Treasury Department has ruled that malleable iron pipe fittings are not being dumped in the U. S. at less than fair value . . . Hamilton Standard Div., United Aircraft Corp. has begun work under a Navy contract to develop an aircraft propeller it claims could increase range of turboprop transports up to 30 per cent and add up to 50 knots to the speed of low level attack planes . . . Westinghouse Electric Corp. has developed a new airborne digital data processor to do 166,000 mathematical operations a second . . . Cone Automatic Machine Co., Windsor, Vt., is doubling the floor space of its British plant at Aldrich near Birmingham; it has a 12 month backlog, including orders from Japan, Italy, and South America . . . Peoples Gas, Light & Coke Co., Chicago, has placed orders with A. O. Smith Corp. for $25 million worth of large diameter steel pipe (500 miles of the product), brightening the somewhat gloomy pipe market.

Metalworking Pulse

The Business Trend: Seasonal upturns in output of electricity and railroad freight carloadings were not enough to counter the decline in auto production and a slight dip in the steel operating rate in the week ended Aug. 13. Result: A 1 point decline in STEEL's index. **Autos:** Startup operations for 1961 model production are beginning to cushion the seasonal decline, but it will be several weeks before production returns to normal. **Steel:** The ingot rate moved up slightly.

- **INDUSTRIAL PRODUCTION**
  - Week ended Aug. 13 . . . **150†**
  - Year ago **114**

  Details on Page 59
- **PASSENGER CAR PRODUCTION**
  - Week ended Aug. 20 . . **60,000***
  - Year ago **31,848**

  Details on Page 56
- **INGOT PRODUCTION RATE**
  - Week ended Aug. 21 . **55.8%†**
  - Week ago **53.5%**

  Details on Page 108

†Preliminary. *Estimated.

Copyright 1960 by STEEL, Penton Building, Cleveland 13, Ohio

NEED TUBING?

Specify TAILORED TUBING!

Made by a specialty mill with 33 years' experience tailoring quality seamless steel tubing to meet the most rigid specifications!

PRESSURE TUBING

TAILORED TUBING for continuous service under high pressures and temperatures.

ASTM	Specifications: Grade	Analysis
A-53		Carbon steel
A-106		Medium carbon steel
A-333	C	1022 steel
	3	2315
	5	2512
A-335	P1	Carbon, ½% Moly.
	P2	½% Chrome, ½% Moly.
	P3	1¼% Chrome, ¾% Moly.
	P3b	2% Chrome, ½% Moly.
	P5	5% Chrome, ½% Moly.
	P5c	5% Chrome, ½% Moly. with Titanium
	P7	7% Chrome, ½% Moly.
	P9	9% Chrome, 1% Moly.
	P11	1¼% Chrome, ½% Moly.
	P12	1% Chrome, ½% Moly.
	P21	3% Chrome, 1% Moly.
	P22	2¼% Chrome, 1% Moly.

Sizes: ⅛" to 3" O.D., including standard I.P.S. sizes ⅛", to 2½" inclusive.

Wall thicknesses in an extra wide range, including Schedules 40, 80, 160 Cold Drawn, and Hot Finished, Seamless pipe.

MECHANICAL TUBING

Machining parts with a hole? Use TAILORED TUBING to simplify fabrication, save time and material.

Available in many shapes (square, hexagonal, etc.) with O.D. from 3/16" to 3½".

Carbon Steel: Standard A.I.S.I. from grade designation C-1008 to C-1070 inclusive.

Alloy Steels: including all A.I.S.I. Open Hearth and Electric Furnace Steels; Haynes Alloy 25, Hastelloy C, X, R 235 and Multimet. But not including stainless, and E-50100, E-51100 and 9200 series.

Resulphurized Steel: In grades C-1118, C-1137 and C-1141.

Can be furnished cold drawn, normalized or any special anneals. Our superior annealing equipment assures meeting specifications with absolute minimum decarburization.

OIL-COUNTRY TUBING

Highest quality TAILORED TUBING for maximum dependability and outstanding service.

Grades: J-55, N-80, P-105 and higher.

Sizes: All the macaroni sizes, ¾", 1", 1¼", 1½", and 2" I.P.S.

Lengths: All standard length Ranges.

Facilities to full length normalize and straighten.

AIRCRAFT TUBING

This sturdy TAILORED TUBING is supplied in round, oval, square, rectangular and other shapes to your specifications.

Specification	Analysis	
MIL-T-5066	1025	Steel
MIL-T-6732	8630	
MIL-T-6733	8735	
MIL-T-6735	4135	
MIL-T-6736	4130	
AMS-5050	1010	
AMS-5075	1025	
AMS-6360	4130	
AMS-6365	4135	
AMS-6530	8630	Magnaflux Quality Steel
AMS-6535	8735	
AMS-6274	8620	
AMS-6281	8630	
AMS-6282	8735	
AMS-6283	8735	
AMS-6323	8740	
AMS-6371	4130	Magnaflux Quality Steel
AMS-6372	4135	
AMS-6381	4140	
AMS-6415	4340	

DECARBURIZATION

With the most versatile annealing and heat treating equipment in use today, Michigan Seamless can supply cold worked, normalized, stress-relieved and soft-annealed tubing for any end use, with decarburization normally less than half allowed by standard specifications.

We will quote and guarantee material to special government specification number MIL-T-6736A insofar as depth of decarburization is concerned.

CONDENSER, HEAT EXCHANGER, AND BOILER TUBES

Now, for the first time plain or integral fin U-tubes from one source! Almost all grades of TAILORED TUBING below are also available as integral fin tube and all can be U-bent to your specifications. Bi-metal tubing also available.

ASTM	Grade	Analysis
A-83		Low carbon steel
A-106		Medium carbon steel
A-161		Low carbon steel
A-179		Low carbon steel *
A-192		Low carbon steel
A-210		Medium carbon steel
A-334	C	1022 Steel*
A-161	T1	Carbon, ½% Moly.
A-199	T3b	2% Chrome, ½% Moly.*
	T4	2½% Chrome, ½% Moly.*
	T5	5% Chrome, ½% Moly.*
	T7	7% Chrome, ½% Moly.
	T9	9% Chrome, 1% Moly.
	T11	1¼% Chrome, ½% Moly.*
	T21	3% Chrome, 1% Moly.
	T22	2¼% Chrome, 1% Moly.*
A-200	T3b	2% Chrome, ½% Moly.
	T4	2½% Chrome, ½% Moly.
	T5	5% Chrome, ½% Moly.
	T7	7% Chrome, ½% Moly.
	T9	9% Chrome, 1% Moly.
	T11	1¼% Chrome, ½% Moly.
	T21	3% Chrome, 1% Moly.
	T22	2¼% Chrome, 1% Moly.
A-209	T1	Carbon, ½% Moly.
	T1a	Carbon, ½% Moly.
	T1b	Carbon, ½% Moly.
A-213	T3b	2% Chrome, ½% Moly.*
	T5	5% Chrome, ½% Moly.*
	T5c	5% Chrome, ½% Moly. with Titanium
	T7	7% Chrome, ½% Moly.
	T9	9% Chrome, 1% Moly.
	T11	1¼% Chrome, ½% Moly.*
	T12	1% Chrome, ½% Moly.*
	T17	1% Chrome Vanadium
	T21	3% Chrome, 1% Moly.
	T22	•2¼% Chrome, 1% Moly.*
A-334	3	2315 Steel*
	5	2512 Steel

*Integral fin tube available.

Sizes: ⅛" to 3" O. D., with wall thicknesses varying from very light to extra heavy. Integral fin tube available in ⅜" to 1" O. D. inclusive.

MICHIGAN SEAMLESS TUBE COMPANY

SOUTH LYON, MICHIGAN

A SUBSIDIARY

GULF STATES TUBE CORPORATION

ROSENBERG, TEXAS

Send your job specifications to us. We will tailor the tubing to do your job. For more details write for full catalog.

FINISH:

Reason enough to buy LeBlond

The glass industry is beginning to turn to mold plungers hard-surfaced with Colmonoy 6 to withstand the corrosion of molten glass. At 57-59 Rockwell C hardness, you don't machine such plungers on ordinary lathes—if you can machine them at all.

Yet Overmyer Mould Company of Winchester, Ind., turns Colmonoy coated plungers in 3 passes *to a 10 micro-inch finish.* That's more than fine enough to *use as-machined.*

Overmyer does it with 15″ LeBlond Dual-Drive Lathes equipped with LeBlond tracers and constant surface speed control. From 1000 rpm at start of cut to 125 rpm at finish the Dual-Drives supply smooth, vibrationless power.

Rock-steadiness for turning rock-hard materials . . . Rigidity without excess weight or size . . . These are strong reasons to buy a lathe. They are reason enough to buy LeBlond.

LeBLOND *of Cincinnati*

THE R. K. LeBLOND MACHINE TOOL CO.
World's Largest Builder of a Complete Line of Lathes
CINCINNATI 8, OHIO

Our Boss—the Customer

A friend has been telling us for years that the trouble with U. S. railroads is that they have insisted they are in the railroad business.

He says they should think of themselves as being in the business of moving people and commodities. With that approach, they would have integrated the newer forms of transportation into their service and avoided the headaches that always accompany business myopia.

The railroads are not alone.

U. S. automakers had to be shown by foreign builders that many of their customers want small, economical cars.

The electric shaver didn't originate with makers of razors and blades. It was introduced by companies outside the industry. Razor and blade manufacturers thought they were in the razor and blade business rather than the whisker removal service.

Should steelmakers think of themselves as being in the steel business? Or should they think as producers of structural materials to satisfy customers' needs?

Should bolt and nut manufacturers insist that they are in the bolt and nut business? Or should they think as producers of better ways to join materials?

Are business magazines in the publishing business? Or are we concerned with the movement of goods and services within industry?

All metalworking managers must now be aware that the big need of the sixties will not be production.

It will be marketing.

And that means finding out what the customer needs, arousing a want, and satisfying the need. It means focusing less on the needs and desires of the seller and more on the needs and desires of the buyer. It requires less preoccupation with the product we have traditionally made (and often lags what the buyer needs).

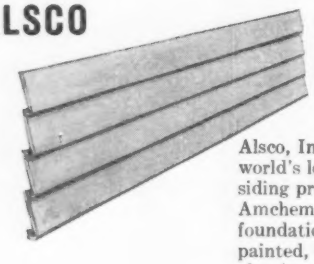
Our boss is the customer.

Walter J. Campbell

EDITOR

7 of the finest in the field specify

ALSCO

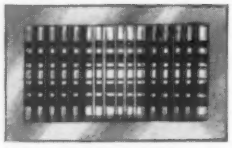


Alsco, Inc., one of the world's leading aluminum siding producers specifies Amchem Alodine® as the foundation for a successfully painted, durable aluminum surface.

GENERAL BRONZE

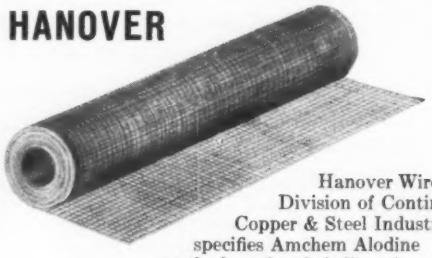
The Alwintite Division of General Bronze Corp. specifies Amchem Alodine and Amchem Aluminum Etchant for a superior, long lasting finish on their popular line of residential aluminum windows.

KRUEGER



Krueger Air Conditioning Corp. specifies Amchem Granodine® for superior pre-paint protection and paint adhesion on steel registers, grilles and diffusers for air conditioning and heating.

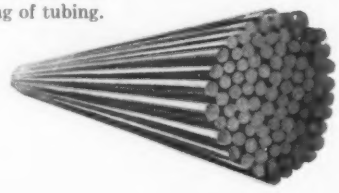
HANOVER



Hanover Wire Cloth Division of Continental Copper & Steel Industries specifies Amchem Alodine as the base for their line of non-glare, corrosion-resistant, color-fast aluminum screening.

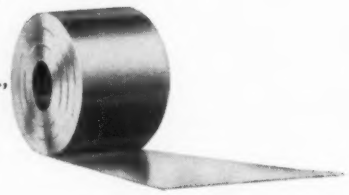
WALLINGFORD STEEL

Wallingford Steel Company, one of the world's largest producers of stainless steel tubing, specifies Amchem Granodraw SS® to facilitate forming of tubing.



CAROLINA METALS

One of the country's top painted aluminum strip processors, Carolina Metal Products Corp., specifies Amchem Alodine for continuous strip pre-paint treatment of aluminum.



AMCHEM for the finest in paint bonding and coating chemicals

BOEING AIRCRAFT

Internationally known Boeing Aircraft Co. specifies Amchem Alodine as a pre-paint treatment, and to treat unpainted portions of the famous 707 jetliner fuselages and engine pods.

If you're looking for superior corrosion resistance, paint bonding and coating performance . . . write for complete information on these and other Amchem chemicals for the metalworking industry.

AMCHEM

Amchem, Alodine, Granodine and Granodraw are registered trademarks of

AMCHEM PRODUCTS, INC.

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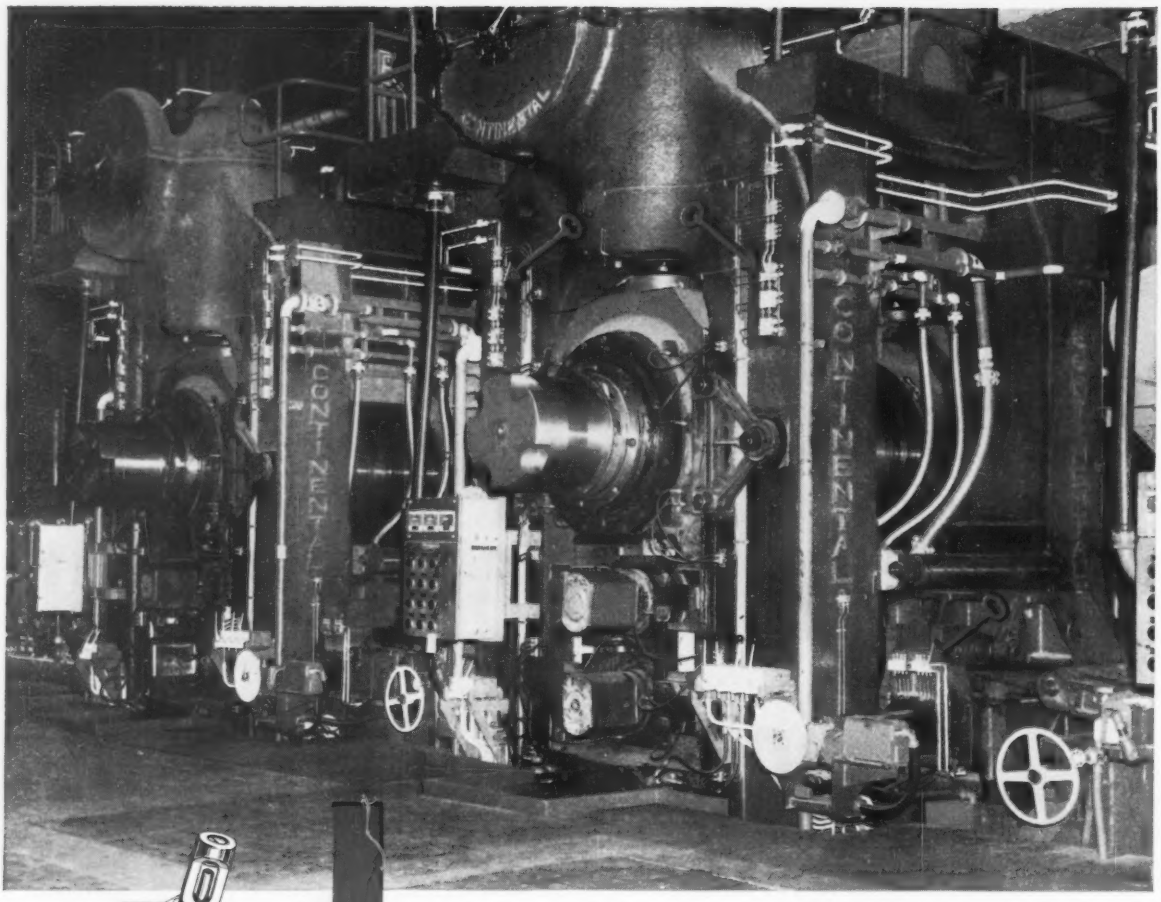
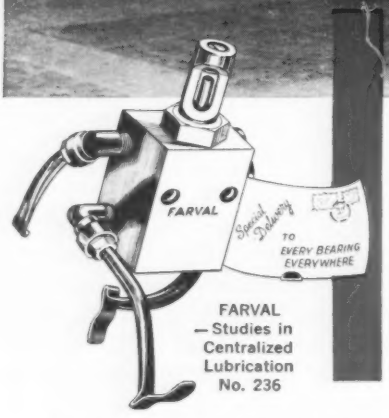




FARVAL
— Studies in
Centralized
Lubrication
No. 236

On new Hot Strip Mill, 10 Farval Systems protect 2023 vital bearings!

Bearing failure on this modern 5-stand, 54-inch semi-continuous hot strip mill will never be a problem. Mill operators know burned-out bearings can stop valuable output, sky-rocket production costs, idle expensive mill crews.

But thanks to 10 Farval lubricating systems—designed-in by the mill builder—this new production unit will feed measured amounts of the proper lubricant to all vital bearings while rolling strip at 2000 fpm. Nine of the systems are motor-driven, time clock controlled setups; one is manual—all operated from centrally-located pumping stations.

Remember, any type of Farval Centralized Lubricating System can be easily installed on either old or new industrial machinery. Let our engineers give you the "Farval Story" today—it will pay dividends in more productive equipment. Ask for free Bulletin **26-T.**

Farval Division • Eaton Manufacturing Company
3270 East 80th Street • Cleveland 4, Ohio

KEYS TO ADEQUATE LUBRICATION

Wherever you see the sign of Farval—familiar valve manifolds, dual lubricant lines and central pumping station—you know steel mill equipment is being properly lubricated.

Stepup in U. S. Trade with Soviets

(Millions of dollars)

	1960 1st Half	1959	1958
Export licenses processed	70.0	100.3	54.1
Licenses approved	59.9	55.7	33.9
Licenses rejected	10.2	44.4	5.8*
Shipments to Soviet bloc	27.0**	89.5	113.1

Source: Commerce Department.
*Fourth quarter only.
**First quarter only.

Should We Trade with the Reds?

YOU CAN'T ASK a more controversial question than that in metalworking circles today. The facts show:

1. More metalworkers (and industry generally) are interested in selling to the Soviet bloc—*as long as sales have the blessing of the government.*

2. The Soviets are stepping up their efforts to purchase steel and equipment from the U. S. Commerce Department officials report a "marked increase" in requests for steel products since the prestrike period 15 months ago.

3. The Commerce Department is granting more export licenses and issuing fewer rejections.

In the second quarter, the latest period for which figures are available, the government granted licenses to export goods worth $24.5 million to the Soviets. Better than 20 per cent ($5.5 million) involved licenses for hot and cold-rolled carbon steel, most of it going to East Germany and Russia. Also included: Permits for $5.3 million worth of equipment to produce aluminum engines (see STEEL July 18, p. 89) and a $2.4 million order for compressors.

In the first quarter, a license for $17 million worth of textile machinery swelled the dollar total of exports to Russia for the period to $35.4 million.

• **Government Attitude**—Washington observers were right in predicting that when Lewis Strauss stepped down as commerce secretary and Frederick Mueller succeeded him, some loosening of export licenses could be expected.

Of course, defense and security considerations haven't been relaxed, and rejections are still common. Recent examples: Applications for licenses to export helicopters; hydraulic presses; electrolytic copper wire, bars, and cathodes; electrolytic nickel cathodes. Export licenses to ship steel products to the Soviets were turned down in the spring of 1959 because of the impending steel strike and industry's clamor to build up its inventory cushions.

Here's the official comment: "The administration of export control responsibilities will be done with a minimum of interference in normal trade practices, but with the necessary vigilance from the standpoint

of national security."

The commerce secretary acts in conjunction with the Advisory Committee on Export Policy, which also represents the State and Defense Departments. Officials point out that several equipment requests have gone to the Defense and State Department officials before licenses were granted.

• **Industry Views**—What do metalworking executives think about doing business with Russia? Reaction runs the gamut.

Howard Snyder, president, Snyder Corp., Detroit, says: "We've sold the Russians a continuous line for making hard medicinal capsules. The order amounted to more than $300,000. We have no metalworking business and don't intend to go after any. Somehow, it goes against the grain to do business with them."

Holmes H. Whitmore, executive vice president, Jones & Lamson Machine Co., reports: "We got an order by dealing with a bartering company with home offices in Amsterdam. Before we even tried to get the business, we went to Washington to get the official government position. We have no intention of doing business that is not in the best interests of the U. S. We know that Russia is placing a lot of business with our competitors in Europe; we simply wanted a share of the business so long as Washington approved." The contract is for $717,600 worth of thread grinders tooled for bearing races and a tap grinder.

Other machine tool builders in the Chicago-Midwest area are also investigating sales possibilities with the Soviets. Said one who's currently bidding on an order: "We're not hurting them (Russians) by not selling to them. They can get the equipment from our European competitors. If it were'nt for our overseas sales, we wouldn't be doing much of anything."

Latest figures by the National Machine Tool Builders' Association point up his argument. Net new orders for metal cutting equipment totaled $33.5 million. Foreign business accounted for $10 million of that sum. In the first seven months of this year, $81.1 million of the $291 million in new orders received were from foreign plants.

Autos May Spur Fall Upturn

LAST WEEK marked the start of autodom's annual drive to shake the consumer out of his summer lethargy and get him into a fall buying mood.

American Motors Corp. opened the campaign by unveiling its new 1961 models for the nation's auto editors. AMC's president, George Romney, hoped to start a chain reaction which would spread to the buying public and support his sales target for next year—a healthy 26 per cent increase over 1960.

All the commotion generated by AMC and other automakers will be welcomed by the nation's metalworkers. Most agree that the consumer needs a pep pill.

Economists and company officials trying to set up fall schedules and make preliminary guesstimates for 1961 planning are hard put trying to draw definite trend lines, particularly for consumer durables.

• **Status Report**—The construction and equipment building facets of the economy seem to be holding steady, indicating that industry buying plans haven't changed much. The Federal Reserve Board reported its July industrial output index remained at the June level, 109 per cent of the 1957 average. STEEL's industrial production index (see Page 59) slipped a point to 150 of the 1947-49 base. But most of the attention is on the consumer—and how he will react to the new cars.

Probably the brightest spot in the outlook—and pessimism is easy to find—is personal income. Louis Paradiso, managing director of the Office of Business Economics, Commerce Department, says personal income rose to an annual rate of $407.1 billion in July, up from $406.1 in June and a $400 billion average in the first six months. "Personal income hasn't hit its peak yet," believes Mr. Paradiso. "It could go much higher in the fourth quarter."

Another factor: The Federal Reserve Bank of Chicago reports that while consumer installment debt passed the $41 billion mark to reach a new high at midyear, payments on outstanding balances remained roughly at the 13 per cent of total personal after-tax income level. The ratio has been pretty stable since 1957.

"Some observers have concluded that the repayment rate is a kind of ceiling," commented the Chicago Federal Reserve officials. But, they added, "if some of the 40 per cent of the U. S. families not now using installment credit were to decide to do so, the 13 per cent repayment ratio could soon fall by the wayside in another burst of credit growth."

• **What Suppliers Say**—Key suppliers of auto components report that their orders for September and October pretty well match year ago levels. The orders basically reflect the production needed to "fill the pipelines" and get the new cars into the hands of dealers. Outlook for the fourth quarter: Auto production of 1.3 million units.

On the negative side, suppliers report a feeling of uncertainty in their contacts with the automakers. "There's talk in some quarters of production next year dropping to 5.9 million to 6.1 million cars," a Detroit partmaker relates.

Concern over the high auto inventories and depressed used car prices abated a little last week. Used car sales figures show a pickup so far this month, and inventories stand at 32.5 selling days (900,000 to 1 million cars) vs. 38 days a month ago and 30.8 days a year ago. Prices also edged upward to $969 (average auction price) vs. $946 in July.

New car inventories dropped 100,000 units in the past month and stand at 1.03 million vs. 976,300 units a year ago. Most of them are standard sized models—practically all the compacts (with the exception of a few Larks and Corvairs) are sold out.

Part of the impetus in the used car market this month has been the result of promotional pushes by the dealers. They know they'll get a flood of 1960 models as the '61s hit the market, and used car inventories will probably climb again.

Avco Honeycomb Process Cuts Costs

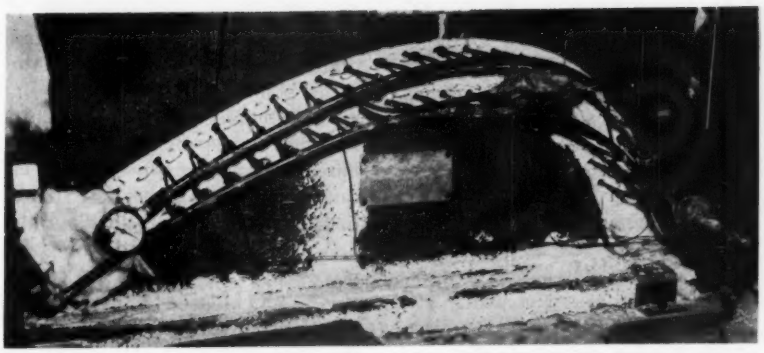
SUBSTANTIAL SAVINGS in the production of stainless steel honeycomb are claimed for a process developed by Avco Corp.'s Nashville, Tenn., Div.

The Avcoramic tooling method makes possible the brazing of large pieces of stainless honeycomb into almost any shape or size and to exacting specifications. Major uses for the material are in missiles and supersonic aircraft. New applications are anticipated.

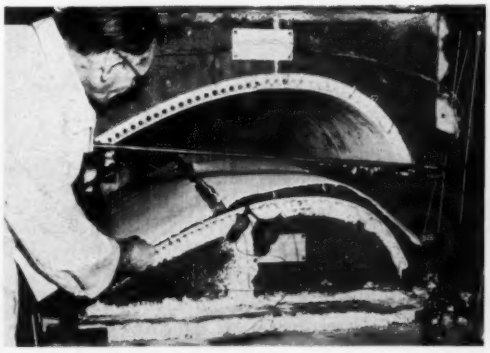
John Mihalic, Nashville Div. president and Avco vice president, gives this appraisal of the process:

"By accomplishing the entire brazing, conditioning, and aging cycle in a single, low cost tool, the Avcoramic process makes it possible to produce such structures at lower costs, and this, in turn, will make it economically feasible to use stainless steel honeycomb in many new applications."

The division reports it has a contract with North American Aviation Inc. to produce sections of the aft fuselage and some of the bulkheads for the B-70 Valkyrie bomber, which is designed to fly at three times the speed of sound.



Ceramic material is heated electrically to brazing temperature in the production of Avco's stainless steel honeycomb



Core and outer panels are arranged in a sandwich and placed between upper and lower platens. Avco's Vice President John Mihalic (right) tests a honeycomb panel in a tank of water. Panels are so light they float

• **How It Works**—Mr. Mihalic explains: "First, we make brazing platens out of ceramic materials. They can be of any size and almost any shape. Holes are put through the material for both heating elements and for cooling purposes.

"Surfaces of the ceramic elements, finished to close tolerances, act as contour forms for brazing the stainless steel honeycomb. After cleaning, stainless steel sandwich materials are enclosed in a steel envelope and placed between the matched ceramic platens. To assure close contact of parts to be brazed, a vacuum is maintained in the envelope and external pressure is applied to the platens.

"The ceramic material is then heated electrically to the brazing temperature, and held there for a short, controlled period.

"Platens and the honeycomb sandwich are cooled rapidly by air forced through the holes in the ceramic material. Even subzero temperatures are possible while the honeycomb assembly is still in the Avcoramic tool.

"Finally, to get maximum strength, panels are aged at an elevated temperature."

• **Key to Success**—Most vital to the new process is the ceramic material developed by Avco, says Mr. Mihalic. It has excellent resistance to thermal shock and can be cast with tolerances of three - thousandths inch. Yet, he adds, with minimum effort, the material can be worked into any shape.

SBA Offers New Service

A new service designed to make it easier for small manufacturers to obtain current information on government supported research and development work is available from the Small Business Administration.

Abstracts of research and development reports covering principal industrial categories will be provided to interested small manufacturers on request. You make selections from an SBA checklist. (Based on Standard Industrial Classifications, it lists information by categories.) Abstracts in the categories selected will be mailed to you as they are issued.

'Going Public' Rides a Boom

PRIVATELY HELD companies in increasing numbers are considering public ownership today for two big reasons:

1. To get money for expansion, diversification, and modernization. Not only does stock issuance provide a source of cash, but it makes it a lot easier to obtain long term loans.

2. It eliminates the danger of inheritance taxes wrecking the firm. "Going public" establishes a measureable value on the company (vs. an arbitrary figure set by the government when principals die) and establishes a market for the heirs' holdings.

The trend to public ownership is a direct result of growth and change in the U. S. economy since World War II. Increased complexity of tax laws and other government regulations have helped. A few statistics point up the trend:

• The amount of new securities issued has increased by at least $1.5 billion every year since 1953, setting an all-time high of $16.6 billion in 1959. In fiscal 1959, the Securities & Exchange Commission processed 1119 registration statements. Officials say they're swamped with registration requests this year.

• The New York Stock Exchange listed 37 companies in the first half. The total for the year may shatter the previous record of 57 hit in 1946.

• The American Stock Exchange listed 63 companies last year. So far in 1960, 61 firms have been listed, and this year could well set a record.

• By 1975, 30,000 businesses now in private hands will have become publicly owned corporations, predict knowledgeable observers.

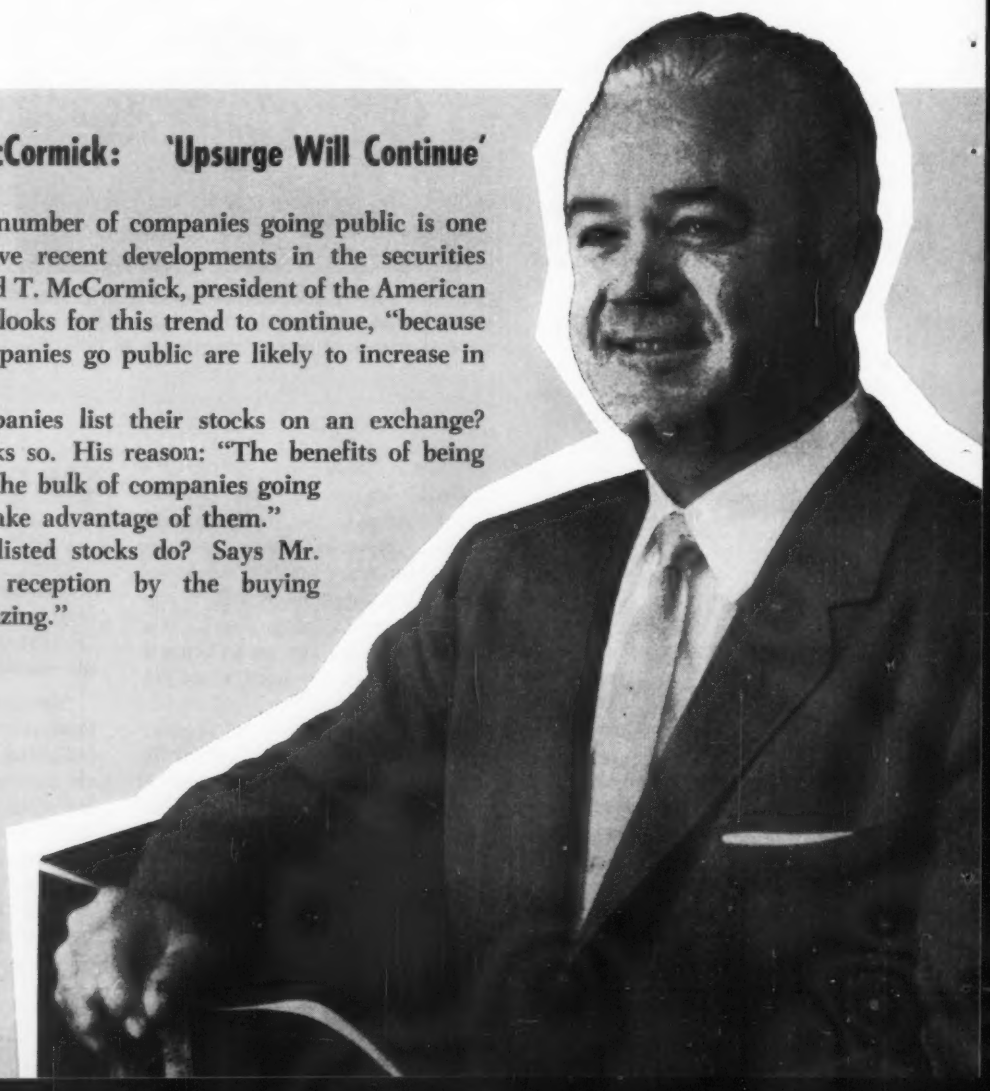
Robert King, president of Profit Counselors Inc., New York consultants, cites this case of how a privately owned company's growth can be retarded: A six year old firm makes specialized, ceramic products for electronics and missiles. It is doing business at the

'Little Board's' McCormick: 'Upsurge Will Continue'

"The growth in the number of companies going public is one of the most distinctive recent developments in the securities field," believes Edward T. McCormick, president of the American Stock Exchange. He looks for this trend to continue, "because the reasons why companies go public are likely to increase in importance."

Will those companies list their stocks on an exchange? Mr. McCormick thinks so. His reason: "The benefits of being listed are so obvious the bulk of companies going public will want to take advantage of them."

How do newly listed stocks do? Says Mr. McCormick: "Their reception by the buying public has been amazing."



rate of $750,000 annually. If the company had the working capital to acquire certain specialized equipment, it could up that rate by $3 million annually right now.

• **Pros and Cons**—Both advantages and disadvantages to going public are cited but a quick glance at the checklist (right) shows that the "pros" far outweigh the "cons." Several metalworking firms that have gone public recently provide these case histories:

Earle M. Jorgensen Co., Los Angeles, operates 13 steel and aluminum service centers (plus fabricating facilities) in nine states. In 1959, it had sales of $56.6 million and earnings of $2 million. The company went public in 1957 and in May of this year became the first metal distributor to be listed on the New York Stock Exchange. Earle M. Jorgensen, president, says the decision to go public was made "to establish a value on the stock of the company and to acquire working capital in order that we might expand our operations and inventories for better customer service." Chief benefits, says Mr. Jorgensen: ". . . it has made us much better known to the public . . . gave us useful working capital with which to improve our inventories and establish new branches."

Only disadvantage Mr. Jorgensen can see: Because of financial reporting requirements, competitors now get information about the company they couldn't before. Sums up Mr. Jorgensen: "We are pleased with our public acceptance and have felt many satisfactions in being a publicly owned corporation. We would recommend it as a gratifying experience and a major aid to any company."

Engelhard Industries Inc., Newark, N. J., went public this summer. The company, which reported $126 million in sales last year, is a leading refiner and fabricator of the platinum metals, a large refiner of gold and silver, and makes a variety of industrial products. Engelhard's move was motivated by the desire of principal owners to establish a value to the stock and by management's need for funds with which to expand.

Nu-Era Corp., Detroit, maker of replacement gears for auto transmission systems and distributor of mufflers, went public in April mainly to get additional capital and to make it easier to obtain capital in the future. Other motivating reasons: To place a value on the company for estate purposes, to gain stature and prestige, and to increase confidence of dealers and distributors in the company. Nu-Era was formed in 1945, did $4.2 million in sales last year.

Culligan Inc., Chicago, producer of water softening and conditioning equipment, became a publicly held corporation Mar. 1. The company went public: 1. To open up another source of capital. "Before, growth had to come from retained earnings; now we can grow in many other ways." 2. To place a market value on the stock. "Owners were placing themselves in a difficult position from an estate standpoint. It would have been difficult to effect a stock trade in an acquisition or merger with no established market value. Such a condition hamstrung the company as far as expanding and diversifying were concerned." In the year ended Apr. 30, the company had $10.3 million in sales, $498,814 in earnings.

Commercial Metals Co., Dallas, one of the country's largest scrap dealers, based its decision to go public this year on these factors: 1. To provide owners and employees with

The Pros and Cons of 'Going Public'

Metalworkers cite these advantages . . .

- **Establishes a value on the company for sale or estate purposes.**
- **Gives owners a market for their stock.**
- **Protects a company against being liquidated to pay inheritance taxes.**
- **Provides funds for expansion, diversification, acquisition, modernization, debt reduction, research and development.**
- **Makes borrowing easier; broadens credit channels.**
- **Tax benefits.**
- **Enhances company's prestige.**
- **Stockholders support company products, increase sales.**
- **Sometimes brings better management; subjects management to closer scrutiny.**
- **Often brings in outside directors with fresh viewpoint.**
- **Incentive stock options with measurable worth can be made to key people.**
- **Improves employee morale.**
- **Makes mergers and acquisitions easier.**

And worry most often about . . .

- **Release of information that will interest and inform competitors.**
- **New discipline that owner-managers might find it hard to live with.**
- **Extra reports and audits that take time, cost money.**
- **Subjecting company to public scrutiny.**
- **Losing control of company (seldom happens).**
- **Nuisance agitation by minority stockholders.**
- **Being required to take on outside directors.**
- **Shareholder desire for dividends when management wants to retain earnings in business.**

After 'going public,' here's . . .

How Stocks of Six Firms Fared

	Stock Price When First Offered		Stock Price July 22, 1960
United Pacific Aluminum Corp.	8	(Jan. 15, 1959)	12⅜
Republic Foil Inc.	12½	(Apr. 28, 1959)	17
Avnet Electronics Corp.	5¾	(June 1, 1959)	16⅛
CompuDyne Corp.	3	(June 17, 1959)	10⅜
Lafayette Radio Electric Corp.	5	(Mar. 11, 1960)	9½
Sunair Electronics Inc.	3	(Apr. 18, 1960)	7

Compiled by American Stock Exchange for STEEL.

a market for their stock. 2. To increase company prestige. 3. To create capital. The company did $83.9 million in sales in 1959, had profits of $754,367.

• **How to Go Public**—Going public is a long, complicated, and often costly process.

The registration statement that has to be submitted to the Securities & Exchange Commission is often the most important initial step. Generally, if you're going to sell securities, you have to register them.

The registration statement requires voluminous data on the company, including the prospectus that will be submitted to potential shareowners. There are three exceptions: 1. If the offering is under $300,000, the company is excused from making the registration statement but does have to file a brief report with any SEC field office. 2. A local enterprise that wants to sell securities to residents of its home state only does not have to file with the SEC. 3. A private offering where securities are offered to a limited number of people is also exempt from registration. However, this stock has to be retained by the buyers, not purchased with the view to distributing it.

After registration requirements have been met, the stock can be offered to the public. An offering is made through an investment banker who underwrites the issue. So one of the first moves is to find an investment banking house willing to handle the issue. Then come legal and accounting examinations by experts in the securities field, an audit by a CPA, perhaps engineering reports by an outside firm, a complete description of how the company plans to spend the money obtained through the issue, placing a selling price on the stock, and preparation of the SEC registration statement and prospectus. When all the conditions have been met, the investment banker will buy the securities and in turn sell them to the public.

• **Watch the Timing** — Experts agree that one of the most important elements in the success or failure of a stock issue is timing. A falling market, international tensions, changes in defense planning, and so on, all can make a stock offering at a particular time disadvantageous. Adds William E. Fischer, controller of Profit Counselors: "For a successful offering, the company needs a good earning record, a good current condition, and good prospects."

• **On the Board**—To most firms today, going public means eventual listing on a stock exchange. Most of the new listings on the American Stock Exchange, for example, are companies that have recently gone public, says Edward T. McCormick, president. The American Exchange cites these advantages of listing: It has advertising value, facilitates future financing, helps with acquisitions and mergers, prices are set in a competitive public auction market, transactions are in the open, stockholders are kept abreast of price changes, distant stockholders are protected, the investing public is given the maximum of protection.

Requirements for listing vary from exchange to exchange. The American Exchange, for example, looks for a company with minimum earnings of $100,000 to $150,000 a year. "We also examine the company's growth," says Mr. McCormick. "We wouldn't want a company that had been at the same profit level for some years." The American Exchange also looks for companies with minimum common stock equities of $750,000 to $1 million which have at least 100,000 shares in the hands of no fewer than 500 members of the public.

The American Exchange has the same basic listing requirements as the SEC. In addition, it requires mailing of an annual report to stockholders. Initial listing fee is $1000. Printing charges run $400 to $450 additional. For future stock issues, the charge is 1 cent a share up to a maximum of $1000.

• **Public Clamoring to Buy**—Uncounted dollars are floating around the country waiting to be plunked down on stocks of newly public companies that show growth potential. The companies cited in this article all sold their initial offerings without any trouble. Cases are numerous today of initial offerings being gobbled up the first day and many are oversubscribed.

• **Going Public Brings Changes**—When a company goes public, it has to be much more concerned with public opinion and attitudes. Outside directors may be brought in for the first time. The company has to keep more complete financial records; has to make public a wealth of information formerly kept under lock and key. For most, any disadvantage is far outweighed by a multitude of plusses.

Japanese Prod Labor in Productivity Drive . . . French, Austrian Markets Grow . . . British Push Sales in U. S.

Sign of the Times . . .

THESE hustling Japanese workers are heeding the sign above them which reads: "Let's all participate in the productivity movement." The scene is Nihon Seiko Co., maker of ball bearings and machinery parts. Foreign manufacturers, like many in this country, are selling employees on the urgency of keeping production high to stay competitive. In Japan, the campaign is being pushed by its Productivity Council. The government subsidized organization is sponsored by more than 2600 companies—220 are in metalworking. Its chief service is technical assistance.

Austrian Buying, Selling Turn Up

Business activity is expanding at a good clip in Austria, reports the Alexander Hamilton Institute, New York. Imports hit a new high in the first quarter, topping the pace in the first three months of 1959 by 24 per cent. Last year's total imports were valued at $1.1 billion, nearly 7 per cent above the 1958 figure.

The export drive is gaining momentum too. The first quarter of this year showed a 17 per cent jump over the like period of last year. The 1959 total was $968 million, 5 per cent greater than the 1958 figure. The bulk of the exports consist of semifinished and manufactured goods, machinery, and vehicles.

During the last five years, Austria's industrial productivity has jumped 37 per cent. The country produced 1.9 million tons of finished rolled steel products last year—a third was hot rolled sheets under 3 mm (about 1/10 in.).

British Intensify U. S. Sales Push

In clipped, precise tones, Sir Norman Kipping, director-general, Federation of British Industries, ticks off these points: "British exports to the U. S. have passed the $1 billion mark for the first time. Britain intends to intensify its sales, marketing, and distribution efforts in the U. S. Many items, like machinery, are enjoying record sales, and many new British-made products are being introduced. British manufacturers are finding a responsive customer in the U. S."

The English made no secret that the recent British Exposition in New York City's Coliseum signaled a stepped up drive to woo U. S. industry. More than 300,000 toured exhibit halls lined with $200 million worth of goods. The Redcoats left the Coliseum so flushed with success that they're seriously thinking of another U. S. trade fair—probably in San Francisco.

France Needs U. S. Machine Tools

"France is in the market for U. S. machine tools and heavy industrial equipment," says Paul Fuller DuVivier, assistant commercial attache in the American Embassy, Paris. Reasons: Oil is being piped in from the Sahara, and Sahara natural gas is expected to be a reality within a few years. The new important sources of energy will give impetus to French industrial expansion.

Australia Wants Our Quotas Cut

Australia hopes the U. S. will review its quota restrictions on imports of Australian lead and zinc. Acting Prime Minister McEwan says that an effort to broaden markets in this country will be made at the upcoming meeting of the General Agreement on Tariffs & Trade.

The Australian government is considering lifting its 21-year-old ban on the export of iron ore. The discovery of new reserves has prompted the review.

Mitchell Attacks Welfare Plan Disclosure Act . . . Japanese, English Firms Win Hydraulic Turbine Contracts

● LABOR SECRETARY MITCHELL SAYS . . .

Welfare Plan Disclosure Act Poses Five Big Problems

1. One-fourth of those with plans are not reporting.
2. Labor secretary can't enforce the law.
3. No one is sure how to interpret the law.
4. No one can investigate the accuracy of reports.
5. Employees haven't got effective method of fighting corrupt managers of plans.

JAMES P. MITCHELL, secretary of labor, has a job to do during the last days of the Eisenhower administration, and he must do it almost alone. The job: Put some teeth into the Welfare & Pension Plans Disclosure Act of 1958, a weak piece of legislation that was designed to protect the more than $30 billion held in trust for the nation's workers.

The Senate passed a much tougher measure, but the House, under heavy pressure from certain unions, cut the guts out of the law, and the Senate agreed on the ground that something is better than nothing.

The President went along with that opinion because the public expected something to be done about thefts of employee trust funds. But he warned at the time: "The chaos that will result is obvious." At least 200,000 plans are involved.

The most obvious shortcomings of the law are noted above. It still allows kickbacks, embezzlement, excessive commissions, excessive retentions, excessive fees, conflicts of interest, diversion of funds, withholding of dividends, and differential treatment of policyholders —practices that existed before the law went into effect. It is a "shameful illusion," says Secretary Mitchell.

● **WHAT MUST BE DONE?** — Sen. Hugh Scott (R., Pa.) and Rep. Peter Frelinghuysen (R., N. J.) introduced bills last year to correct some of the law's major failings. Nothing was done then, and nothing will be done during this short session. Except for congressmen like Senator Scott and Representative Frelinghuysen, not many legislators are showing much interest.

The secretary of labor recommends: 1. A full annual report on the status of each fund, rather than the present "summary" report, which allows abuses to be covered up. 2. The secretary should be designated as the man to make authoritative interpretations of the act. 3. He should have subpoena power and authority to seek injunctions, plus the right to conduct investigations of suspected violations of the act. 4. Embezzlement and kickbacks should be made a federal felony. 5. Only the secretary should be allowed to designate variations in the reporting methods of plan administrators. 6. Detailed lists of all investments made by trust funds should be required.

● **JAPANESE AND ENGLISH FIRMS WIN** — As expected (STEEL, Aug. 15, p. 52) low bidders Hitachi, New York Ltd., Ibaragi-Ken, Japan, and English Electric Export & Trading Co. Ltd., New York, won contracts for four of the nine hydraulic turbines on Bureau of Reclamation projects. They are the first reclamation contracts to be won by the two firms. Hitachi was the low bidder on five other turbines, but the Bureau rejected it on the grounds of no previous experience with the bureau's technical standards. Two other English Electric bids were lower than the winning U. S. manufacturer and were rejected on the same grounds as Hitachi's other bids. James Leffel & Co., Springfield, Ohio, and Newport News Shipbuilding & Dry Dock Co., Newport News, Va., were among successful U. S. bidders.

● **CAPITOL NOTES**—The Small Business Administration will provide a checklist of government research and development reports to small firms . . . More urban renewal projects (184) were approved in fiscal 1960 than in any other 12 month period since 1949. Funds granted totaled $335 million . . . About 250 miles of the Interstate Highway System were completed in the second quarter . . . Sen. Alexander Wiley (R., Wis.) wants a new survey of the St. Lawrence Seaway potential to speed up its use by domestic firms . . . The Federal Aviation Agency is considering parallel runways at airports to increase traffic loads.

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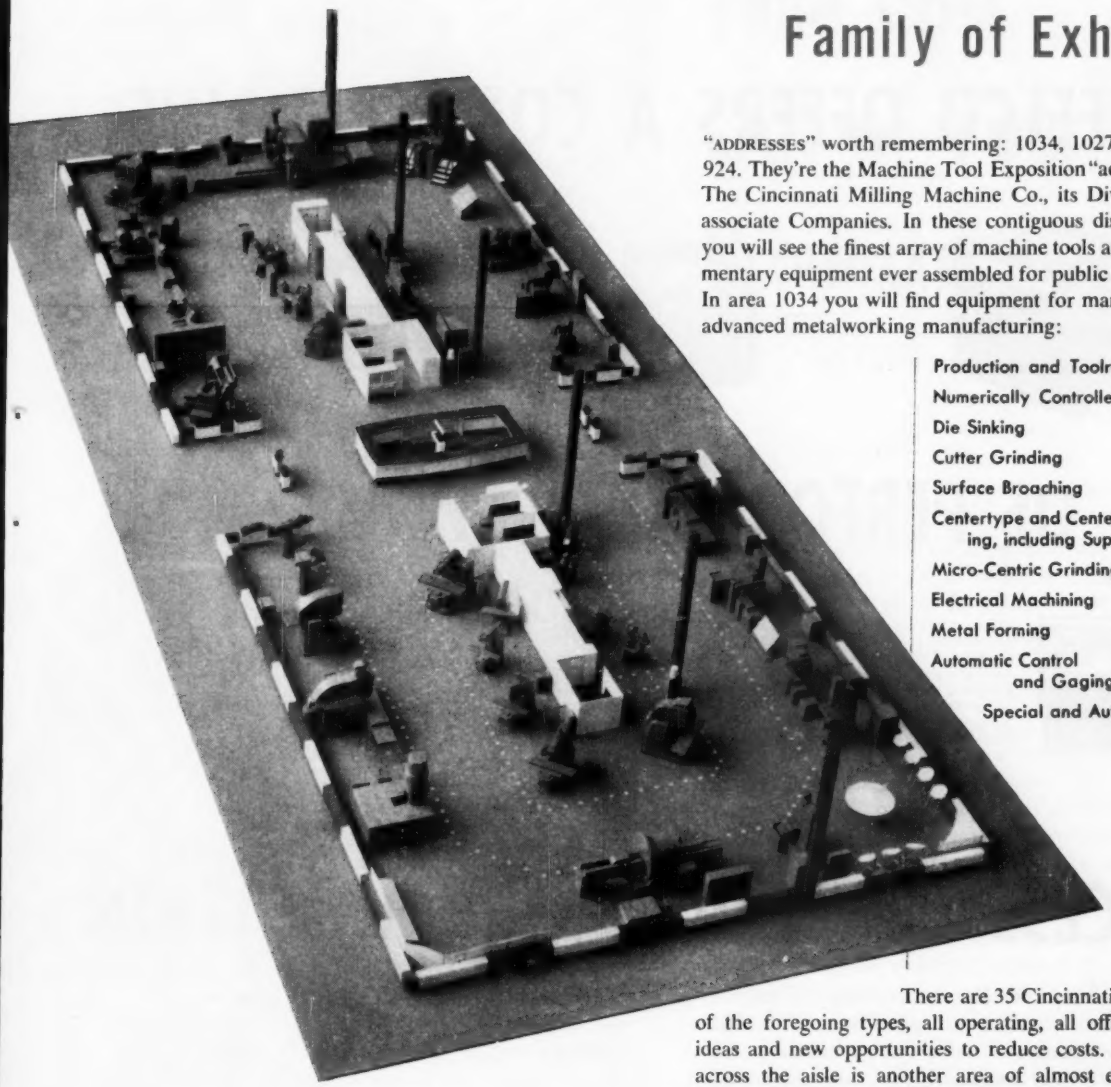

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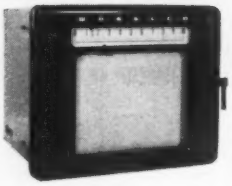

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"Set dollar targets for cost reduction," advises W. L. Davis, Emerson's vice president-engineering. The proof of the approach: $1 of every $3 in the firm's net profit last year resulted from cost reduction through product redesign. Mr. Davis points out four examples

How to Take Cost Out of Your Products

If you would like to boost your profits while you're cutting prices, take a tip from Emerson Electric M'g. Co., St. Louis. Here's an exclusive report on how the diversified electrical equipment producer does it.

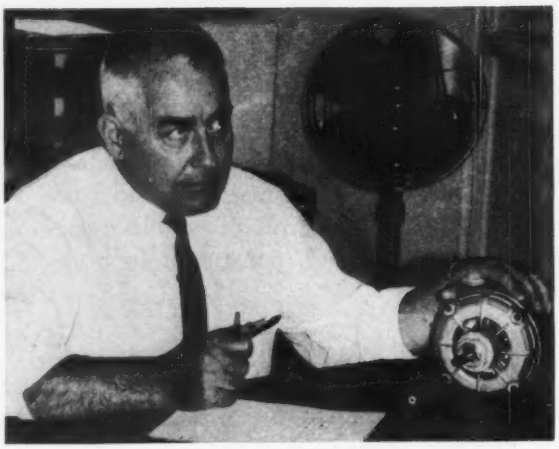
LAST YEAR, cost reduction through product redesign accounted for 34 per cent of the net profit at Emerson Electric. And that's only half the story: Nearly as many dollars were added to profits via other cost cutting routes—overhead control, decentralization of facilities, scrap and rework incentive plans, smart purchasing, automation. And not all of the savings found their way into earnings—some were passed along to the customer in lower prices and better quality.

In 1955—when Emerson launched its private war on costs—the company had a pretax profit of $2,214,000 after absorbing $881,250 of increased material costs and effecting price cuts amounting to $1,124,000. The firm's profit would have been only $208,750 that year—less than 10 per cent of the actual figure—had it not been for the war on costs. But Emerson saved $1,347,000 through product redesign, $491,000 through overhead reductions, and $481,000 in a scrap and rework program.

That kind of success has continued. Take cost reduction through product redesign as an example. In 1958, savings were $1,048,000 (41 per cent of net profit); in 1959, savings rose to $1,350,000 (34 per cent of net profit). This year's goal is $1,640,000.

STEEL went to St. Louis to find out, first hand, how such savings can be made consistently. Turn the page for the complete report . . .

"If a product or part has been made the same way for two years, you can probably find a way to make it cheaper or better," asserts John Repp, value analysis chief. He points to a ball retainer that was redesigned with a cost saving of 79 per cent



"Get everyone—foremen, operators, inspectors, engineers—into the war on costs," suggests B. A. Purcell Jr., assistant vice president-operations. For example, take the motor Mr. Purcell is holding. Suggestions from foremen, operators, and engineers cut rejects 44 per cent

Product Redesign

Most progressive companies know how much profit is being made on each item they manufacture. But Emerson doesn't stop there: It translates profit margins into cost reduction goals. A corporate dollar target for most reduction is set each summer at an executive planning session. It is based on forecasts of material and labor cost trends for the coming year, product price trends, an analysis of the competitive situation, and forecasts of each product's sales volume. The company's goal is then interpreted into dollar cost reduction targets for specific products.

• **Picking the Candidate**—In his search for products to be redesigned, John Repp, Emerson's value analysis chief, uses two guideposts: 1. A product's unit sales volume. 2. The time that has passed since the product was last redesigned. His rule of thumb: "If it's been made the same way for more than two years, you can probably find a way to make it cheaper and better." Adds W. L. Davis, vice president-engineering, "We now redesign almost all of our products before they are two years old."

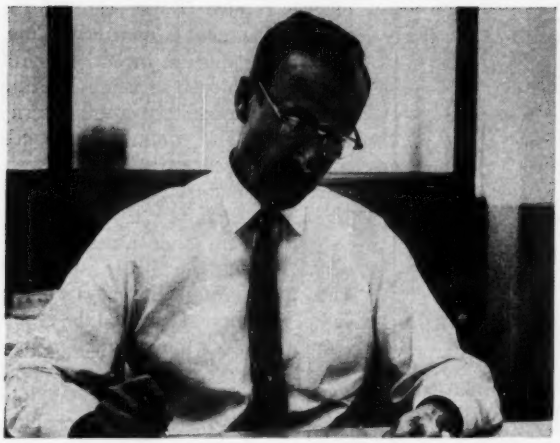
• **Setting the Goal**—Emerson determines a gross profit margin for each product in each of its nine (soon to be ten) plants. Then, it finds out how much cost must be taken out of each product to obtain that margin. That cost figure becomes the cost reduction target for the product. In some cases, it is not possible to trim the cost that much and maintain features. When that is determined, the sales department is consulted: Does it want to keep the feature and raise the price, or lose the feature and lower the price?

• **Getting Ideas**—When a cost reduction target is set, the dollar figure is communicated to engineering, manufacturing, and purchasing. Each department attacks the problem. Production workers too are fully briefed on the problem and asked to contribute ideas. "Almost anybody can do a better job if he understands the detailed requirements," Mr. Davis asserts. "To get ideas, you must overcome a person's traditional way of thinking about the product or the process," says Mr. Repp. "And you must communicate the urgency of cost reduction."

• **Organizing the Effort**—Emerson uses the value analysis approach: Have at least one top level man whose sole responsibility is cost cutting; use a conscious, organized approach to the problem; concentrate on the function of the product or part under scrutiny; define that function and set a dollar value on it; bring as many people into the act as you can; establish a system to insure a fair evaluation of each idea; set time targets and meet them; encourage employees to work smarter (not harder); always guard against the five ways of thinking that bring about high product costs: 1. The temporary circumstance (do it the expedient way). 2. The honest wrong opinion (you were sure you needed a forging for wear). 3. The ignorance factor (you didn't know there was a material like that on the market). 4. Habit (the draftsman automatically specifies that kind of fastener). 5. Lack of information (you thought the part would be exposed to high temperatures). 6. Lack of ideas (———).

• **Using Suppliers' Brains**—"We must define the areas in which we are expert and improve our abilities there, then learn the areas in which each of our suppliers excels and help him to improve his ability," Mr. Davis points out. "You must make the supplier your partner and tell him what you want to do."

Example No. 1—Emerson com-



"Don't automatically buy what the engineers specify; always check for equivalent items," proposes L. A. Dahlheimer, director of purchases. Example: He's buying a steel that costs $9 a ton less than what was specified, is investigating another type that would save $13 more

municated its dollar cost reduction target on a product to a tubing supplier. The supplier helped to eliminate six parts—which cut into his volume. "But since he helped us to improve product quality and cut costs, his business with us will increase," Mr. Davis notes.

Example No. 2—On a fan, Emerson took the supplier of guards into confidence, told him "we'll have to redesign the guard or drop the fan from our line." Emerson asked him to figure out a way in which it could make maximum use of his automatic equipment. He came up with a new, much less costly design. "We'll have to redesign the fan to use the new guard," reports Mr. Repp, adding with a smile: "But that's all right; we'll probably save money there too."

Example No. 3—Emerson was using a weldment for one part on a power tool. The firm called in a sheet metal supplier and a foundry, asked them for designs using their processes. The part is now a stamping, but the foundry has come up with a new diecasting that is under consideration.

• **Creating Enthusiasm**—The enthusiasm that you find in all departments at Emerson originates "in the corner office," says a vice president. He asserts that W. R. "Buck" Persons, Emerson's 50 year old president, "has an energy curve that is a straight line at 100 per cent." The attitude is contagious.

Mr. Persons recognizes that the key to Emerson's profit growth is the training, skill, and attitude of the firm's employees, who realize that the company's success means personal success. Mr. Persons points out to them that Emerson is not competing with giant industrial corporations, but "with people just like ourselves in those other companies."

• **It Pays Off**—Almost everyone at Emerson seems to have donned fighting togs and rushed into the cost war. A stenographer, for example, contended that "a lot of money is being wasted in operating a duplicating machine." An investigation showed that paper usage was nearly five times the machine's capacity. So it was placed under the control of one girl—with $6000 annual savings in paper costs.

Redesign of seemingly insignificant parts too has brought huge savings. Examples: 1. A ball retainer in a power tool was made from a stamping and two forgings. A switch to a diecasting cut the cost by 79 per cent. 2. A switch from die formed aluminum to plastic on a cover for controls slashed the cost per piece by 70 per cent and improved appearance.

Being on the lookout for the unusual has paid off too. Example: Emerson makes a small heater that is used where appearance is unimportant. It was buying housings for the heater until Mr. Repp noticed that the heater fit exactly into a common tote pan. The firm now plans to buy the tote pans for housings.

Another tip: Try to combine. Using one base for two fans cut costs 25 per cent.

• **Extending Application**—Emerson is now setting cost targets for each function on new products—before they reach the design stage.

Decentralization

Another aspect of the Emerson cost war is decentralization of manufacturing facilities. In 1956, the company had two plants. It has moved many operations to the South to take advantage of the lower wage rates there.

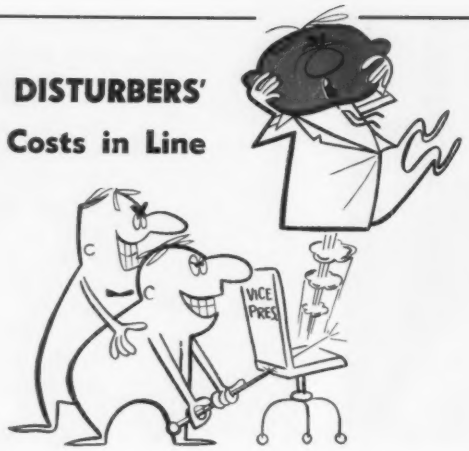
Emerson really had three reasons for decentralizing: 1. Lower labor costs. 2. Integration of all phases of a production operation under one roof. 3. The relative ease of establishing new manufacturing techniques in a new plant vs. an old one.

The new plants have permitted the company to apply an "islands of automation" concept. In making a plant layout, the firm starts with the concept of a fully automated facility. But conditions seldom permit that. For example, the bulk of Emerson's motor output is for OEM use, with many different specifications. So the company breaks out those parts of the operation that are common to several products. Then the volume justifies automation. So an "island of automation" is established. Parts are fed from the islands to a central assembly line. Example: One man operates seven machines in an island turning out motorshafts. The job had been done on two lines with three men.

Overhead Control

Every department in Emerson's Commercial Products Div. has a dollar target for overhead costs. It's computed as a percentage of the di-

'STATUS DISTURBERS' Keep Costs in Line



ONE REASON for the success of Emerson's cost reduction efforts: Four "status disturbing" groups keep executives on their toes . . .

● JUNIOR MANAGEMENT BOARD—Made up of middle managers (foremen to the level just below vice president) elected for two year terms, this group meets afterhours each month to consider corporate problems. It reports directly to the president and has "congressional immunity." Its primary function is to train middle managers to analyze top management problems. Sometimes, they go beyond the training stage and originate corporate programs. Since no area is sacred to the board, it serves to keep vice presidents on their toes.

● SALARIED ADVISORY BOARD—Representatives of Emerson's 12 office areas work on projects such as parking facilities, lighting, noise, systems, and procedures. The group writes formal reports to the president.

● FOREMEN'S ADVISORY BOARD—Made up of elected representatives of the shop foremen, this group tackles problems of "firing line" manufacturing operations.

● MANAGEMENT ADVISORY COUNCIL—The company officers and department heads meet for dinner once each month to investigate, review, and analyze corporate cost objectives. For example, they might consider how a department in St. Louis could help alleviate an overhead problem at the Washington Park, Ill., facility.

rect labor costs in the department. The over-all dollar figure is then broken down into monthly dollar figures for each overhead item. The department head must operate his area at or below that cost each month. The system keeps the managers aware of all cost items, gives them a good basis for trimming. Example: It's an excellent aid to keeping inventories in line.

'Our Own U-2'

Emerson has a planned program to understand the detail of design and manufacture of all competitive products. It gives the firm a good basis for quality and cost comparisons, points up areas in which it must push cost reduction.

Scrap and Rework

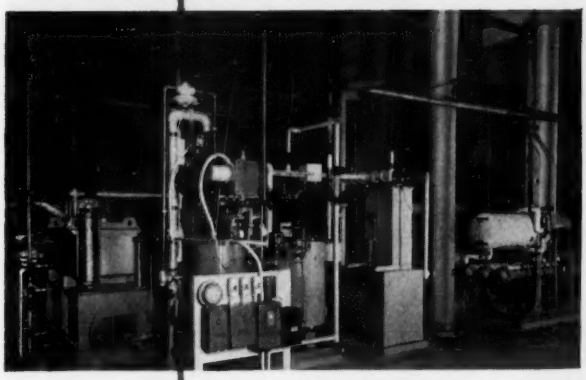
To lower scrap costs, Emerson has set up an incentive bonus plan for production workers. Targets are established for scrap generation, corrective work, and labor variation. If the employees' performance is below the target (for the sum of three factors), the employees receive 50 per cent of the savings. Payment is quarterly. Complementing this, an incentive bonus committee meets monthly to find ways of overcoming unusual scrap expenses. The committee is made up of representatives from inspection, manufacturing, personnel, and line supervision, plus the production superintendent and the shop stewards. B. A. Purcell Jr., assistant vice president-operations, is chairman. If there is a trouble report from the field, the production part might be brought into this meeting. The problem and its cause will be pointed out (even if the problem is faulty design). Objective: Get everyone to look for ways to cut costs and improve quality. The approach works. Example: Winding line rejects on one product had increased somewhat. It was brought up at the meeting and the word was spread. Suggestions from foremen, operators, and engineering personnel cut rejects 44 per cent.

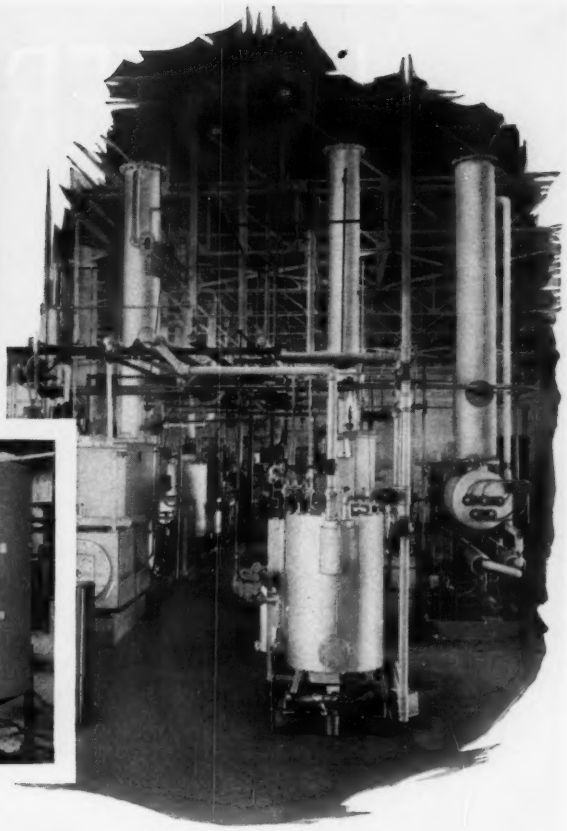
Smart Purchasing

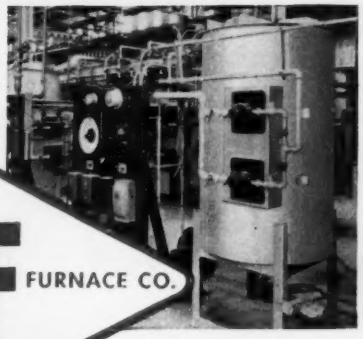
"Too few companies take advantage of the brain power they have in their purchasing departments," contends Mr. Davis. Emerson's director of purchases, L. A. Dahlheimer, carries a powerful weapon in the war on costs. One approach he practices: Always check for equivalent items; don't automatically buy what the engineers specify. Example: While buying a new kind of stock for motors that costs $9 a ton less, machines just as easily, performs the function just as well as the type originally specified, he's already investigating another material to replace the new one. It would save another $13 a ton.

"We always try to have at least two suppliers for any item we purchase, but we concentrate on as few suppliers as possible. We like to be important to a supplier," Mr. Dahlheimer reports. "Always be on the lookout for a new item," he adds, "We talk to every sales representative that calls—in the hope that he can save us money or give us better quality."

• If you'd like to have a copy of this article, write to Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio. You may win $1000 by using material like this in STEEL. For details, see the Servicenter, Pages 5 and 6.







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Protective Atmosphere Equipment

Exothermic and Endothermic Generators, Ammonia Dissociators, High Nitrogen and High Hydrogen Generators, Refrigerators, Dryers, Desulphurizers, CO_2 Scrubbers, and Auxiliaries, for Industrial Furnace Processing.

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Our equipment is skillfully designed and ruggedly built for long, dependable operation. Completely automatic. Proven in hundreds of exacting installations. Sizes for any hourly capacity.

Ask us also about our wide experience in designing and building roller hearth, wire mesh belt, car bottom, roller rail, catenary, bulkhead tray, walking beam, bell, pit, rotary, screw and other types of furnaces for annealing, normalizing, galvanizing, coating, carburizing, brazing, sintering, billet heating, malleablizing and other heat treatments.

For special atmosphere generating equipment, and continuous or batch furnaces for heat treating any ferrous or non-ferrous material, you'll find "It pays to call the EF heat treating engineers". Let us work with *you* on *your* next project!

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Twenty pages. It illustrates and describes the many different types of furnaces we build, and the applications in which each is used.

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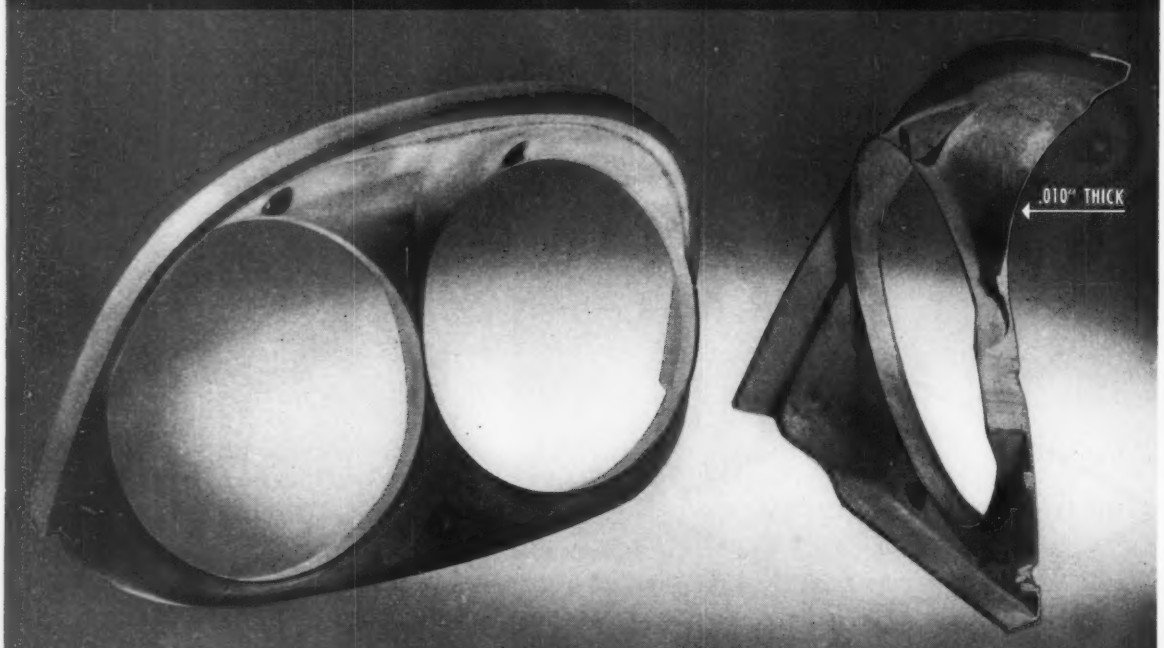
IT'S LIGHTER THAN YOU THINK!



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RIGID . . . DURABLE . . . ECONOMICAL

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Airfoil sculptured styling of today's automobiles demands parts designed to complement flowing body and fender lines.

ONLY ZINC DIE CASTING ALLOYS can produce the intricate shapes and smooth, compound-curve surfaces—as in this headlight door — with the necessary thin-wall sections, strength, rigidity and production economy.

Improved techniques in chromium plating on Zamak die cast parts provide a more permanent bright finish with greater resistance to corrosion than ever before.

The weight-saving advantages of ZINC die castings, with built-in qualities of durability and economy, point up the important reasons why Zamak has become the leading material for the production of die cast parts in today's automobiles.

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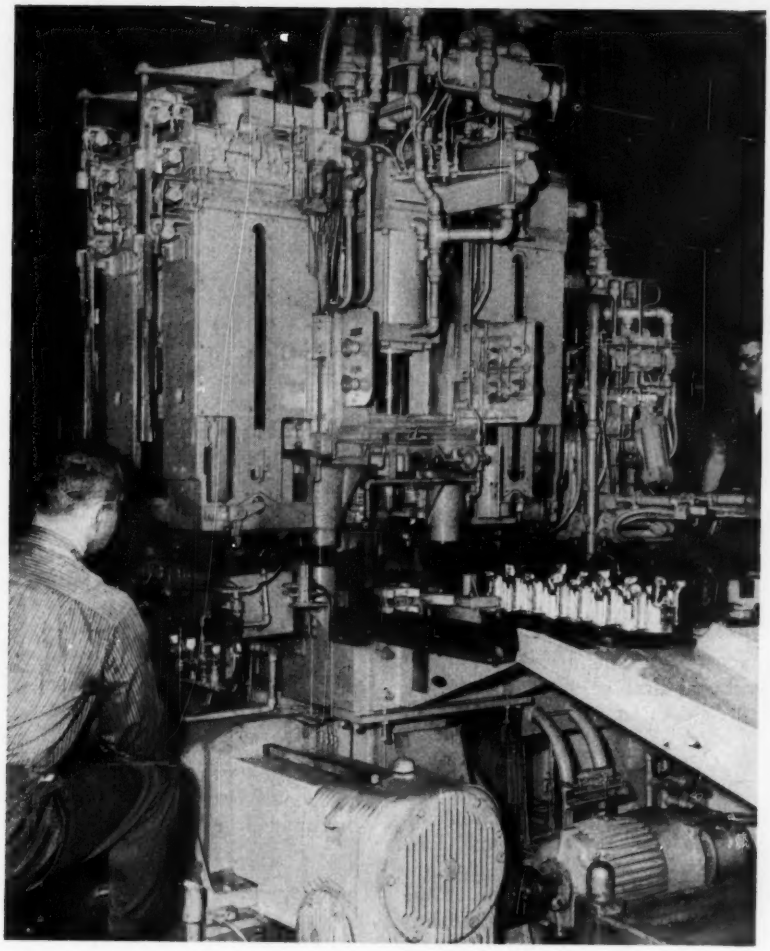

Chevy's rotary machine casts 600 pistons an hour

Piston Markets Expand

THE THIRTY-TWO, major, independent manufacturers of pistons in the country are anticipating a market of 100 million units by 1963.

Passenger cars, trucks, and tractors are the biggest applications. They take almost two-thirds of the country's annual production for original equipment and replacements. Chief uses of the remaining third: Industrial engines, outboard motors, and power mowers.

This year, it looks like the passenger car market will take 52 million pistons with a sales value of $42.5 million. Trucks will use 8.4 million units valued at $10.9 million. Tractor sales will reach 1.1 million units ($1.9 million).

Roughly 80 per cent of sales are for original equipment. Most of the passenger car pistons are made in captive shops. Jobbers, fleet owners, and engine rebuilders are the major replacement markets. Rebuilders are the largest group. There are 24 major firms in the country. They consume 1.6 million pistons ($2.9 million worth) yearly. Pistonmakers sell both rough cast and finished pistons to these markets.

• **Progress** — Automakers are working constantly to improve piston life, temperature resistance, and combustion performance. Since the early 1950s, virtually all automobile pistons have been permanent molded aluminum castings. There are hundreds of variations in size, shape, design, and finishes to meet performance requirements. Ford, Chrysler, and Studebaker-Packard pistons are tin plated. GM and AMC depend more on ring design and piston materials to get wearing qualities and temperature resistance. Cadillac is the only volume car producer that uses Stannate coated pistons.

The heaviest passenger car pistons (29.8 ounces) are used in Mercury's 430 cu in. powerplant. The lightest (10.6 ounces) are in Lark's 169 cu in. engine. The average manufacturing cost of cast pistons is around 70 cents. The vender's sales price is usually around $1, although special, heavy duty pistons may cost considerably more.

• **Advances**—In efforts to cut costs, automakers and suppliers have tried many piston alloys. Some of the high silicon aluminum alloys show promise. So do specially coated pistons. Magnesium has been tried. So have some costly copper alloys.

But the industry feels most improvement can come via manufacturing methods. Pistons made from powder metal have been used with fair success in small engine applications, but they have not stood up in passenger car powerplants. Forgings have been long time favorites for heavy duty pistons, but they're generally more costly than the cast types. Two other processing methods have been recently announced. They may help reduce piston costs.

• **Extrusions** — Thompson Products Light Metals Div. (Cleveland) of Thompson Ramo Wooldridge Inc. has designed a piston that can be impact extruded from aluminum bar

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To keep us on the move . . .

IT TAKES A LOT OF PISTONS

(Millions of units)

	Original Equipment	Replacement	Total
1962*	81.5	17.8	99.3
1960*	78.1	17.2	95.3
1958	51.7	14.9	66.6
1956	68.3	13.4	81.7
1954	57.2	11.3	68.5

*Projected. Based on information from industry sources. Includes passenger cars, trucks, tractors, industrial motors, outboard motors, and lawn mowers.

stock. The company won't reveal process details, but claims the pistons compete costwise with cast types and have the strength of conventionally forged types. The firm has already sold 2 million units to the automotive replacement market and as original equipment for outboard motors. It is also pushing hard to crack the passenger car replacement market.

At least one carbuilder is considering the piston for an aluminum V-6 engine it hopes to introduce in 1963.

Thompson claims it can compete with cast pistons because it buys its extrusion stock in volume and because its piston is one-third lighter than a cast type of the same size. Company engineers are studying ways to extrude the piston with a steel insert in the top ring groove area. They're also trying anodic coatings over the ring belt area and have made test pistons containing up to 22 per cent silicon. The highest silicon content in forged aluminum pistons is 12 per cent. The high silicon alloy should offer low expansion coefficients and excellent wear resistance, believe Thompson engineers.

● **Captive Method**—General Motors Corp.'s process development group has developed an automatic, rotary pressure casting machine that can turn out 600 pistons an hour. Three are being readied for the 1961 model run at Chevrolet Div.'s Massena, N. Y., foundry.

Each machine has two parts, a core stacker and a molder. Ten sets of cores and eight sets of molds are used. They're fully interchangeable. The core stacker handles four cores in a two cycle operation. The molding machine has four stations. Cores are loaded automatically into the stacker. It rotates, and piston inserts automatically are inserted into the cores. The next turn brings the cores into line with the molds on the molding side of the machine.

Molten aluminum is maintained in a 2200 lb holding furnace behind the dual machine. The furnace feeds a measuring reservoir which holds enough aluminum to cast a single piston. Air is evacuated to −8 psi in the reservoir. Atmospheric pressure on the aluminum in the holding furnace pushes the molten metal into the reservoir until it comes up ½ in. from the top of the smaller chamber. When it reaches that point, a heat sensitive device automatically shuts off the vacuum. At the same time, air pressure at 16 psi forces the aluminum out of the reservoir into a Y-shaped pouring trough and then into the risers at each side of the mold cavity.

Pistons are trimmed, rough machined on the outside diameter, weighed, and checked automatically on a conventional line prior to heat treat.

What Price Reliability? Compare Assembly Line Costs vs. Dealer Repairs

Quality cost cutting starts at the manufacturing level, declares C. G. Bauer, Chrysler's quality control director. He points out that the direct labor cost of installing a certain small interior accessory is 10 cents. If it is discovered to be defective at a later inspection point, the direct labor cost of replacing it is $1.50. If the item gets to the customer and must be replaced under warranty, the cost is $7.50.

Another example is a small engine part. Initial direct labor is 2 cents, says Mr. Bauer. Correction at the engine plant costs $2, but if the defect is discovered at the assembly plant, the replacement cost is $18. It costs $100 if the part must be replaced under dealer warranty.

Explaining why quality control will always be a relative rather than absolute, Mr. Bauer says that a single assembly line, operating for two shifts at a 60 car per hour rate, consumes 2000 tons of material—involving 7.7 million separate pieces that range from a bolt to an engine.

U. S. Auto Output

Passenger Only

	1960	1959
January	688,731	545,756
February	659,323	478,518
March	654,242	576 080
April	582,909	578,846
May	611,226	546,817
June	613,147	557,995
July	434,377	555,410
7 Mo. Totals	4,243,955	3,839,422
August		239,149
September		258,151
October		507,527
November		254,527
December		494,931
Total		5,593,707

Week Ended	1960	1959
July 16	105,113	127,502
July 23	112,179	124,446
July 30	107,019	122,518
Aug. 6	103,504	108,240
Aug. 13	84,155†	72,603
Aug. 20	60,000*	31,848

Source: *Ward's Automotive Reports.* †Preliminary. *Estimated by STEEL.

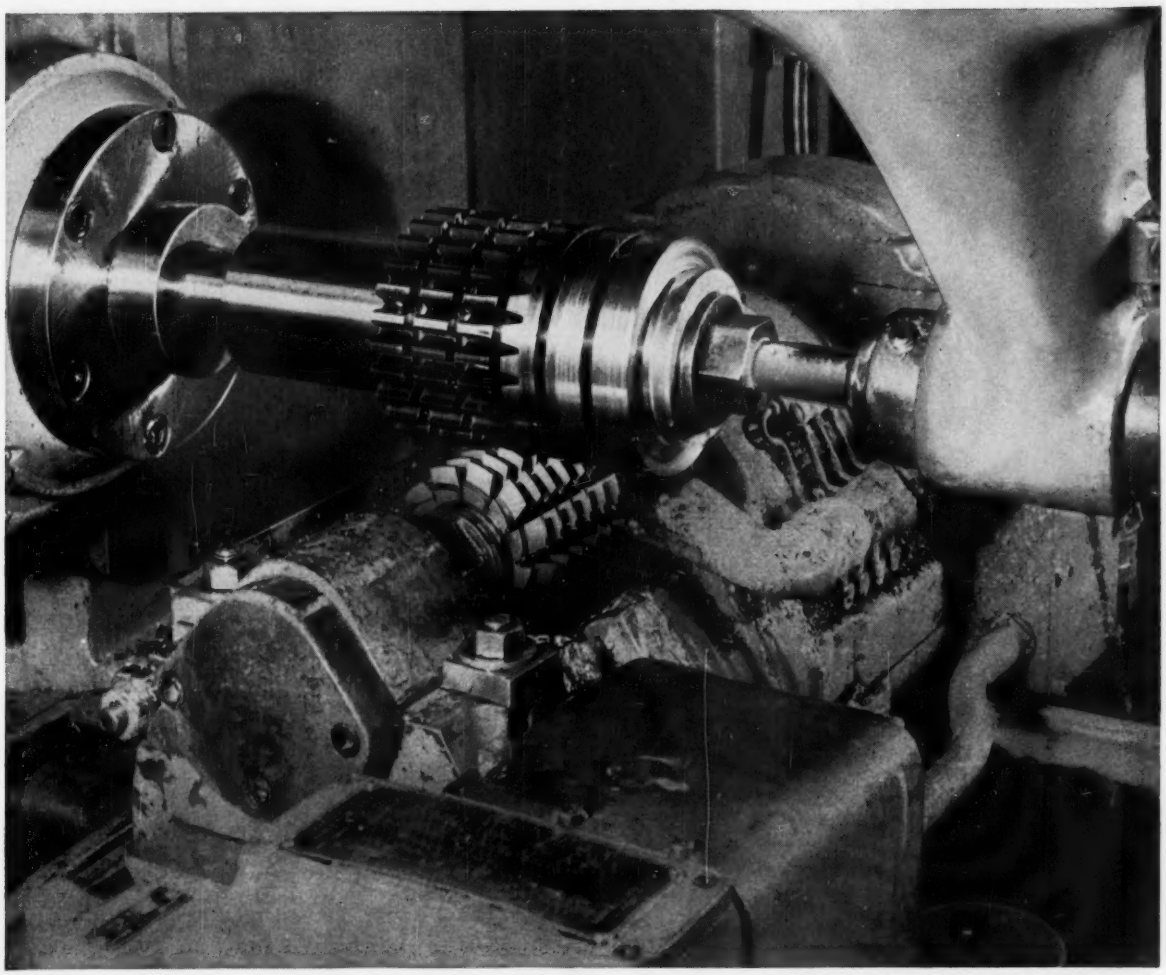

Photo courtesy Chelsea Products, Inc.

Aristoloy Leaded Steel provides free machining for Chelsea Products, Inc.

Steel for gears used in power take-off assemblies must have uniform hard surface, high tensile strength and yet machine freely. Aristoloy Leaded* users have benefited from these qualities.

Chelsea finds more gears can be cut from leaded Aristoloy before the hob needs sharpening. Production can be improved and speeds and feeds increased over non-leaded steel.

Strength and hardness are not affected and the finished part reveals no detectable difference in physical properties from steel previously used.

For complete information call the Copperweld representative in your nearest large city . . . or write today for New Products & Facilities Catalog.

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ARISTOLOY STEELS

DIVISION OF
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ARISTOLOY STEEL DIVISION • 4005 Mahoning Ave., Warren, Ohio • EXPORT: Copperweld Steel International Co., 225 Broadway, New York 7, N. Y.

Weighs a 64% cost reduction

Fastener survey by RB&W seeks to deliver maximum holding power per fastener-dollar ... makes possible substantial savings

Since the job of a standard fastener is mainly to hold an assembly together, its *"clamping force"* is what you really want. You can reduce costs by applying this fact and buying fasteners by their *holding power* rather than size.

For example, compare SAE "proof load" and cost ratios of four different hex screws of standard steels.

Grade	SAE Grade 5	SAE Grade 2	SAE Grade 2	SAE Grade 2
Size	¾ x 5"	1 x 5"	1⅛ x 5"	1¼ x 5"
Proof load (lbs.)	28,400	16,950	21,350	27,100
Cost Ratio	100%	188%	239%	277%

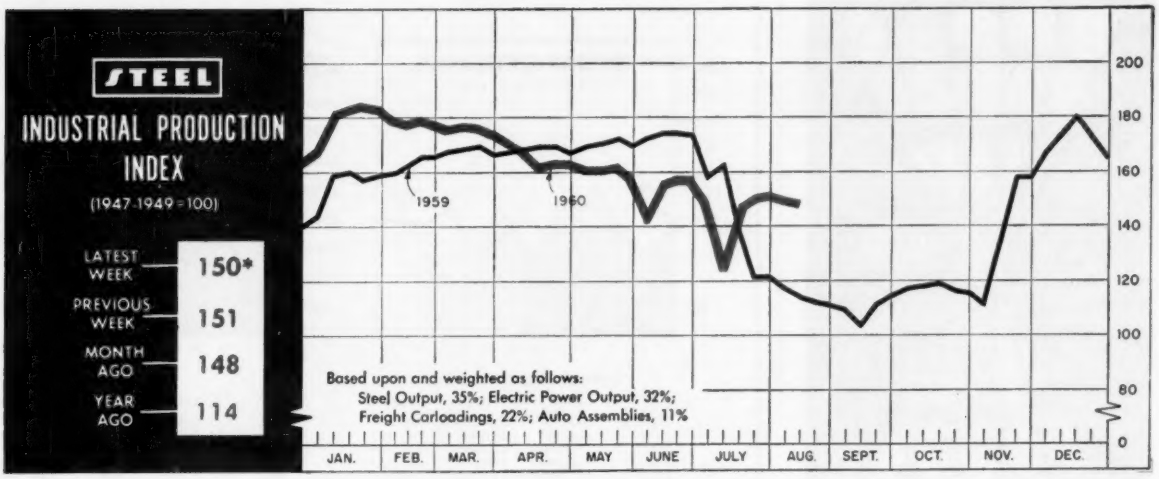
Almost unbelievable. The smallest—the heat treated RB&W High Strength Hex Screw—exceeds all the others in load capacity, can usually be used instead of any of them. But, since it's smallest and weighs less, it also costs you less. 64% less than the 1¼" Grade 2 screw; 58% less than the 1⅛", etc. And because holes can be made smaller, you save on production, too.

Want to get the most from *your* fastener dollars? Let a specialist who best knows the subject of fasteners contribute his knowledge to that of your engineers. Contact Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N. Y.

RB&W

116th year

Plants at: Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. Additional sales offices at: Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco. Sales agents at: Cleveland, Milwaukee; New Orleans; Denver, Fargo. Distributors from coast to coast.



*Week ended Aug. 13.

Summer Doldrums Take Business Toll

THE NATION'S ECONOMY is usually in the summer doldrums at this season, and 1960 is no exception. STEEL's industrial production index (it's now at 150, down 1 point from last week) reflects the business weather brought about by vacations and other seasonal cutbacks.

Record electrical output and the anticipated seasonal upturn in freight carloadings are not sufficient to counterbalance the so-so activity in the steel industry and the sharp downturn in auto output caused by shutdowns for model changeovers. The auto decline pushed the index to the third lowest level of the year for a nonholiday week. Despite the laxness, the Federal Reserve Bank of New York reports the economy continues to produce a record level of real output. But it hastily adds: Some business analysts note an absence of factors that would lead to a pronounced surge in demand. It sees the possibility that a continued reduction in the rate of inventory accumulation may be a drag on economic activity over the next few months.

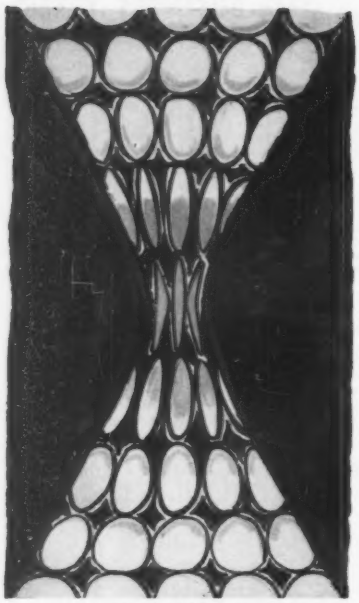
• **Why the Lethargy?**—The First National City Bank, New York, reports that industry's basic problem is the same as it was at the start of the year: Because production rates are not fully supported by new orders, backlogs of unfilled orders are declining; because more goods are being produced than are being shipped, over-all inventories continue to rise—although more slowly than in earlier months. Corporate profits have failed to keep pace with sales gains, revealing a squeeze on profit margins in sharply competitive markets.

However, as noted in last week's Business Trend (STEEL, Aug. 15, p. 65), the decline in steel, copper, aluminum, and other basic metals may be the source of the present uncertainty. Unfilled orders of durable goods have dropped 8.5 per cent, but if primary metals are

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	1,589[1]	1,525	321
Electric Power Distributed (million kw-hr)	14,800[1]	14,709	13,648
Bituminous Coal Output (1000 tons)	7,850[1]	8,190	6,840
Crude Oil Production (daily avg—1000 bbl)	6,840[1]	6,837	6,773
Construction Volume (*ENR*—millions)	$435.5	$561.7	$412.9
Auto, Truck Output, U. S., Canada (*Ward's*)	98,005[1]	118,380	84,086
TRADE			
Freight Carloadings (1000 Cars)	605[1]	594	544
Intercity Truck Tonnage (changes from year ago)	−1.7%	−1.2%	+10.3%
Business Failures (Dun & Bradstreet)	269	293	274
Currency in Circulation (millions)[3]	$32,129	$32,044	$32,071
Dept. Store Sales (changes from year ago)[3]	−2%	+1%	+9%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$23,822	$27,102	$22,051
Federal Gross Debt (billions)	$288.2[1]	$288.3	$288.1
Bond Volume, NYSE (millions)	$24.7	$22.7	$30.3
Stocks Sales, NYSE (thousands of shares)	14,700	13,864	13,880
Loans and Investments (billions)[4]	$105.1	$104.7	$105.1
U. S. Govt. Obligations Held (billions)[4]	$27.1	$27.3	$29.6
PRICES			
STEEL's Finished Steel Price Index[5]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[6]	230.6	231.1	217.7
All Commodities[7]	119.4	119.4	119.2
Commodities Other than Farm & Foods[7]	128.3	128.3	128.4

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1960, 2,849,306; 1959, 2,831,846. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-39=100. [6]1936-39=100. [7]Bureau of Labor Statistics Index, 1947-49=100.



BRMCO 3004 STRIP ALUMINUM MATCHES 5052...

SAVES COMPANIES $40.00 A TON

A top electrical equipment manufacturer, wanting to reduce production costs, asked BRMCO and several other leading mills to develop a 3004 strip aluminum to replace the 5052 they were using. Because of a critical forming operation, they required a tensile strength within 37,000-42,000 psi, with a 5% minimum elongation.

BRMCO field engineers, metallurgists and production men attacked this difficult problem, realigned strip production methods and quickly produced a 3004 strip with the required tensile strength and with an elongation factor well above the minimum requirement.

BRMCO now can save all manufacturers $40.00 a ton in strip aluminum costs by supplying them these 5052 characteristics in a lower cost alloy.

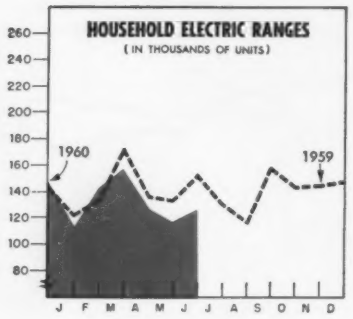
This same technical assistance can cut your nonferrous strip costs, increase your production. Write or call today, without obligation. If you phone, call EDison 7-4434 (Bridgeport—collect) and ask for Larry Hayden, field service department.

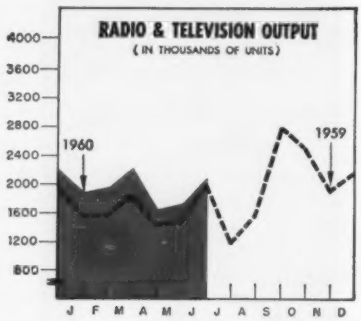
FINE QUALITY ALUMINUM, BRASS AND BRONZE IN STRIP AND ROLLS

BRMCO

Bridgeport Rolling Mills Company
BRIDGEPORT, CONNECTICUT
Subsidiary of Atlantic Coast Industries, Inc.

THE BUSINESS TREND





Total Factory Sales—Units

	1960	1959	1958
Jan. ..	113,500	120,800	109,000
Feb. ..	143,200	134,600	104,700
Mar. ..	156,400	172,600	117,900
Apr. ..	127,000	136,100	95,600
May ..	117,600	133,400	96,000
June ..	126,200	151,400	116,800
July ..	.....	129,200	98,500
Aug. ..	.....	116,600	81,400
Sept. ..	.....	157,200	122,300
Oct. ..	.....	143,400	135,100
Nov. ..	.....	144,000	129,100
Dec. ..	.....	147,500	144,000
Totals .	.....	1,686,800	1,354,400

National Electrical Mfrs. Assn.
Charts copyright, 1960, STEEL.

	Radio		Television	
	1960	1959	1960	1959
Jan. ...	1,356	1,125	526	437
Feb. ...	1,442	1,125	503	460
Mar. ...	1,668	1,348	550	494
Apr. ...	1,230	1,010	423	389
May ...	1,277	1,010	442	432
June ...	1,551	1,430	519	571
July ...	....	829	...	350
Aug. ...	....	1,009	...	547
Sept. ...	....	1,981	...	809
Oct. ...	....	1,796	...	707
Nov. ...	....	1,316	...	561
Dec. ...	....	1,553	...	593
Totals ..	....	15,622	...	6,349

Electronic Industries Association.

taken out, the decline for all other durables is only 3.5 per cent. Backlogs for those industries have practically held steady since March.

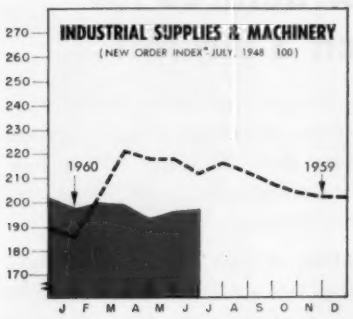
• **Are Services Gaining?** — Some sources suggest that an increasing amount is being spent on services, accounting for the disappointing start of the Soaring Sixties. In its preview of the new decade, the Department of Labor said: "As our technology advances, proportionately fewer workers will be needed to produce the goods we need. More workers will be needed to provide the increasing services required as our standard of living goes up." As pointed out by STEEL last week (Aug. 15, p. 45), there is some statistical basis for that contention.

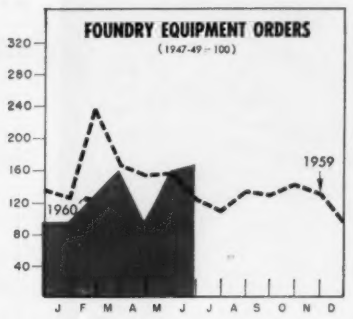
But Morgan Guaranty Trust Co. of New York states: When the services-goods apportionment is viewed in terms of personal expenditures, there is a lack of evidence that consumers are transferring their personal incomes from goods to services. True, personal expenditures for services (exclusive of government services paid for in taxes) rose from 31.1 per cent of the total spent in 1947 to 39.1 per cent last year. But that was primarily because the prices of services were rising faster than the prices of goods.

• **Spending Breakdown**—In "real" terms (dollars of constant purchasing power), the purchase of services didn't gain much (from 34.3 to 37.8 per cent of the total). The New York bank reveals that the greater bite taken out of the consumer's dollar by taxes is divided rather evenly between goods and services. The breakdown shows how the 1929 consumer and his '59 counterpart spent his dollar.

	1929	1959
	(In cents)	
Food and beverage	23	20
Housing	13	10
Clothing	11	7
Automobile and supplies	6	8
Household operation	5	5
Saving	5	6
Household goods	5	5
Transportation .	3	3
Taxes	3	12
Other goods ...	10	10
Other services ..	16	14

The change in the "admissions" subdivision of recreation, which is included in the "other services"





	1960	1959	1958	1957
Jan.	198	186	163	221
Feb.	200	202	157	219
Mar.	199	221	149	210
Apr.	194	218	148	203
May	196	218	152	199
June	197	212	164	199
July	...	216	170	197
Aug.	...	212	172	197
Sept.	...	207	178	203
Oct.	...	204	187	192
Nov.	...	202	189	180
Dec.	...	202	190	167

*Seasonally adjusted.
Amer. Supply & Machinery Mfrs.' Assn.

	1960	1959	1958
Jan.	95.5	127.4	57.9
Feb.	128.6	237.1	57.6
Mar.	159.9	166.6	85.9
Apr.	97.9	151.2	88.7
May	159.0	157.0	136.1
June	164.8	125.1	87.7
July	....	110.7	77.9
Aug.	....	134.1	74.1
Sept.	....	131.3	64.5
Oct.	....	140.8	118.9
Nov.	....	131.2	83.3
Dec.	....	95.9	137.0
Avg	....	142.6	89.1

Foundry Equipment Mfrs. Assn.

category, may be significant. The drop more than offsets the increase in all other types of recreation spending, which would indicate that much spending has shifted from services to goods. New interests such as television, hi-fi, do-it-yourself projects, are replacing the theater, movies, and other "attendance" activities.

Foreign Car Sales Slip

In the first half, foreign car sales fell 7.2 per cent below those of the similar period in 1959. Collective sales of the seven "captive" imports sponsored by U. S. carmakers (English Ford, Opel, Taunus, Vauxhall, Simca, Metropolitan, and Mercedes-Benz) were 25,000 units below where they stood in the first half of 1959, says *Ward's Automotive Reports.*

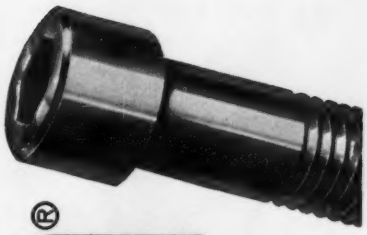
The figure is just a little bigger than the over-all drop in foreign car registrations. Comparison: 270,713 during the first half vs. 291,772 in the comparable period of 1959. All the loss was recorded in the second quarter.

Increased registrations of several imports (mainly Volkswagen) have offset declines of other independent carmakers. Renault is holding its own. *Ward's* concludes that the newly introduced U. S. compacts are hurting sales of their own imports; several are competing in the same price bracket.

Trends Fore and Aft

• The consumer's attitude toward spending in the first half reveals a reluctance to increase indebtedness via the purchase of home goods on time, states John M. Snow, executive vice president, National Association of Furniture Manufacturers. In an era when disposable income mounted to new highs, Mr. Snow notes that weaknesses were apparent in a number of high priced items. However, he sees no reason for pessimism, at least for the furniture industry, because sales are "still 1 per cent ahead of 1959's, and that's 1 per cent ahead of the industry's best year."

• Total retail sales of television sets in the first six months exceeded first half, 1959, sales by 17 per cent. Radio set sales topped those of the same period of 1959 by nearly 23 per cent. The number of picture tubes sold at the factory level was up almost 2 per cent, but receiving tube sales fell about 4 per cent below the year-ago pace.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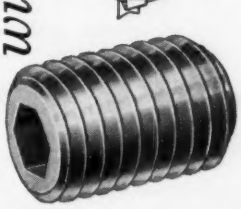

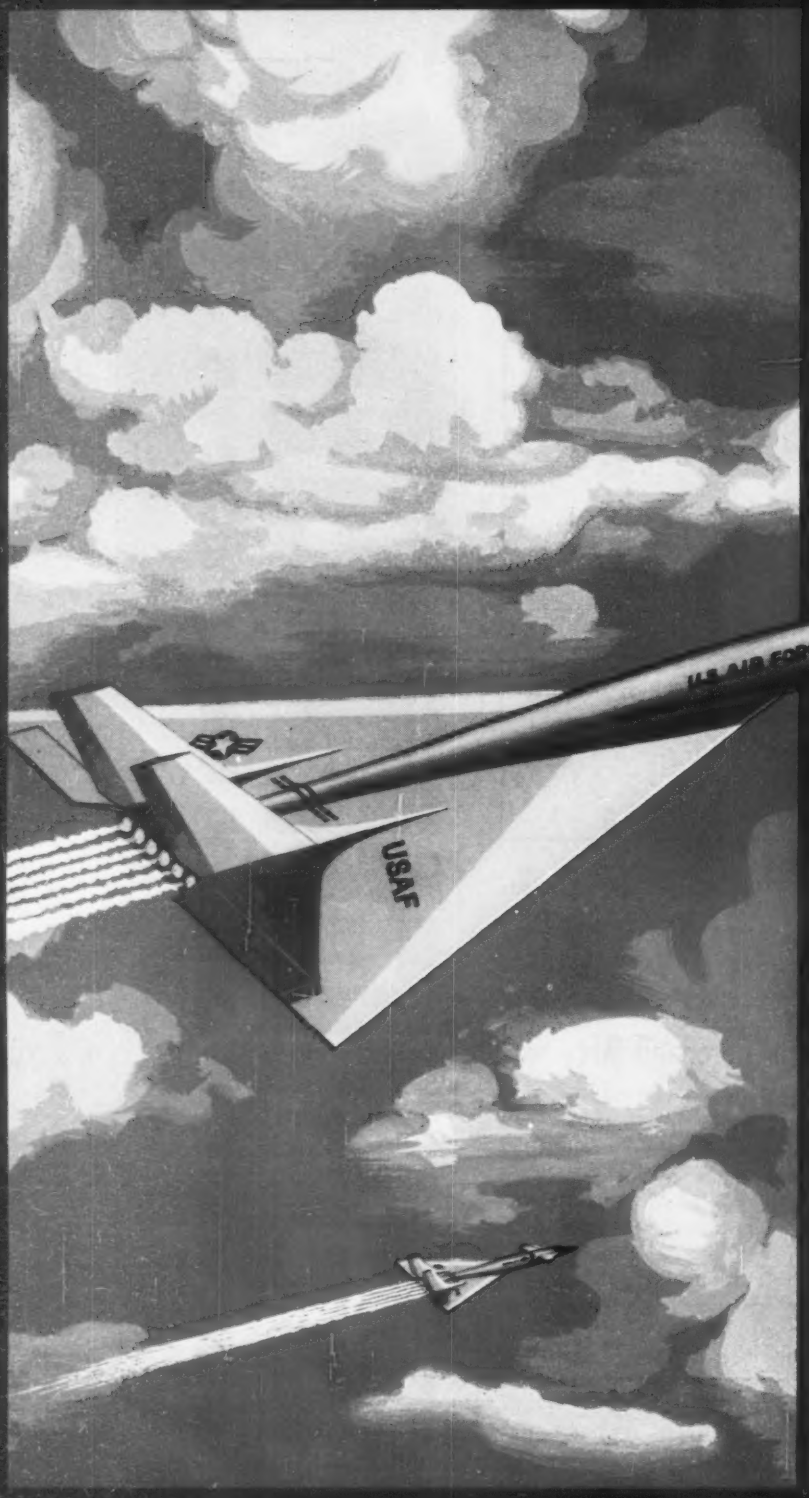

from Avco/Nashville ... structures for mach 3 aircraft

The prototype of the future for military and commercial aircraft, North American Aviation's B-70 *Valkyrie*, will include major structural components from Avco's Nashville Division.

Production of high strength-to-weight structures is a specialty of the Nashville Division. For that reason, Avco/Nashville was one of the companies selected to produce panels for a section of the B-70 fuselage. *Avcomb* panels of stainless steel honeycomb are exceptionally strong, yet light, and offer high resistance to heat. These tough panels are produced by a new process called *Avcoramic* tooling, designed to make better quality panels at lower cost.

Avco/Nashville's work also includes components for the new Convair 880 and 600 jet transports and for the Lockheed *Hercules* military transport. Nashville offers breadth and depth of experience in designing, engineering and producing all types of lightweight honeycomb structures, including aluminum, titanium, and fibre glass for aircraft, missiles, space vehicles, and radar reflectors.

New tooling processes for stainless steel honeycomb panels, together with Nashville's broad experience gained over many years, afford its customers a unique combination of quality and skill. Why not put this experience to work on your structural problems? *For more information write: General Marketing Manager—Structures, Nashville Division, Avco Corporation, Nashville 1, Tennessee.*

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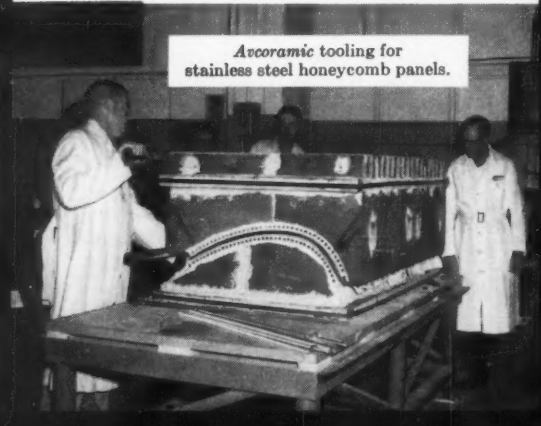


Avcoramic tooling for stainless steel honeycomb panels.

CARL VONLINSOWE
Case Co. mgr.-eng.

ALFRED DANGLER JR.
Hercules Galion pres.

HUBBERT L. O'BRIEN
rejoins Graver Tank

JOHN E. JACOBS
Bethlehem Steel v. p.

Carl vonLinsowe was appointed director, engineering - industrial products, **J. I. Case Co.**, Racine, Wis. He was manager-engineering of the company's Churubusco, Ind., Works. He now directs industrial and utility machinery engineering as well as the firm's Arizona proving grounds.

Alfred Dangler Jr. was elected president, **Hercules Galion Products Inc.**, Galion, Ohio. Formerly executive vice president-general manager, Mr. Dangler succeeds **E. Paul Monroe**, retired.

Carl T. Fuller was promoted to manager-special product sales and transferred to Allen Park, Mich., by **Wolverine Tube Div.**, Calumet & Hecla Inc., Chicago. He was sales manager, Chicago district.

George J. Peer was made sales manager - furnace products, **Basic Inc.**, Cleveland. Before assuming the new post, Mr. Peer was Midwestern district sales manager.

John Kacmarik was appointed general manager, Franklin, Pa., plant, **Chicago Pneumatic Tool Co.**, New York, effective Sept. 1. He succeeds **H. E. Moore.** Mr. Moore will remain at Franklin (as a consultant) until Dec. 31. Mr. Kacmarik was manufacturing control manager, Utica, N. Y.

H. E. Temple was advanced to director, research and development, Food Machinery Div., **Baker Perkins Inc.**, Saginaw, Mich. **P. H. Valentyne** was made chief engineer, food engineering department.

Hubbert L. O'Brien has returned to **Graver Tank & Mfg. Co.**, a division of Union Tank Car Co., East Chicago, Ind., as chief contracts engineer. He was district sales manager, Los Angeles, until 1955. Before rejoining Graver, he was a consulting engineer in Auburn, Ala.

Robb W. James was chosen general manager, Westinghouse Air Brake Co.'s **Union Switch & Signal Div.**, Pittsburgh. He succeeds **A. M. Wiggins**, who will retire Sept. 1. Mr. James was executive vice president, National Pneumatic Co. Inc. and Holtzer-Cabot Electric Motor and Telephone Divisions, Boston.

Ralph R. Thomas was promoted to general superintendent, **Interlake Iron Corp.'s** Erie, Pa., plant, succeeding **Waldo C. Portz.** Mr. Thomas was assistant general superintendent.

Jack E. Fathauer was chosen product manager, Speedloader system, **National Malleable & Steel Castings Co.**, Cleveland. He was sales manager, railway division.

Donald J. Sauser was named engineering manager - technical sales and service, Cherry Rivet Div., **Townsend Co.**, Santa Ana, Calif. He was service engineer.

Flovd M. Hunsaker was named specialist, spectroscopic carbon and graphite products, **National Carbon Co.**, division of Union Carbide Corp., New York. He was manager of the analytical laboratory, Albany, Oreg., Div., Wah Chang Corp.

John E. Jacobs was elected vice president-steel operations, **Bethlehem Steel Co.**, Bethlehem, Pa. He succeeds **Edmund F. Martin**, who was elected president.

Earl A. Junck has joined **Worden-Allen Co.**, Milwaukee, as purchasing agent. He was with Harnischfeger Corp.

Donald L. DeVries was appointed sales manager, Metal Products Div., **Koppers Co. Inc.**, Baltimore. He was manager of the division's industrial gas cleaning department.

Universal - Cyclops Steel Corp., Bridgeport, Pa., has promoted **Edward E. Hall** to assistant general sales manager. He was manager-technical services.

John H. Nelson was elevated to sales manager, **Williamsville Buff Co.**, Utica, N. Y. He was sales representative for New England.

Link Div., General Precision Inc. (subsidiary of General Precision Equipment Corp.), Binghamton, N. Y., has advanced four men: **Lloyd L. Kelly**, formerly vice president-sales, was made vice president-administration and marketing. **John M. Hunt**, vice president-technical director, Palo Alto, Calif., also became director-simulator engineering and development, Binghamton. **Edward W. Sheridan**, previously executive assistant to the president, was named director-industrial products division, a new group. **Joseph C. Barron**, formerly government sales manager, Washington, was made general sales manager-mili-

CHARLES W. MASSIE JR.
Clark Equipment Int. v. p.

ELMER J. KREGER
supt.-Amer. Hoist & Derrick

MILTON C. JORDAN
mgr. in Puerto Rico

LEO F. BROWN
Huck Mfg. Co. v. p.

tary and training equipment, Binghamton.

Charles W. Massie Jr. was appointed vice president-sales, **Clark Equipment International,** subsidiary of Clark Equipment Co., Buchanan, Mich. He was general sales manager. His headquarters are in Brussels, Belgium.

Walter P. Barrett was selected manager-machinery sales department, **Dravo Corp.**, Pittsburgh. He continues as manager-pipe fabrication department.

Dr. Horace N. Lander was named assistant director-research, **Youngstown Sheet & Tube Co.**, Youngstown. He was research supervisor, Jones & Laughlin Steel Corp.

Hellmuth Strauss was named vice president-general sales manager, **Walworth Co.**, New York. He returns to the company he served for 25 years before leaving it in 1957. Mr. Strauss succeeds **Harold Brown,** resigned.

Elmer J. Kreger was promoted by **American Hoist & Derrick Co.**, St. Paul, to general superintendent, foundry and pattern shop, and the company's subsidiary, Valley Iron Works.

Milton C. Jordan was chosen plant manager for **International Resistance Co.**'s operation in Vega Baja, Puerto Rico. He succeeds **Louis Hamburg,** transferred to Philadelphia as production supervisor, IRC's Plastic Products Div., a new post. Mr. Jordan was production manager of IRC's Boone, N. C., Div.

Harold Taylor has joined **Harold G. Taylor Co.**, Toledo, Ohio, as vice president.

I. John Billera was elected executive vice president-operations, **U. S. Industries Inc.**, New York. He was senior vice president.

Robert J. Baumann was appointed manager, Systems Div., **Beckman Instruments Inc.**, at Anaheim, Calif. He was acting manager.

Leo F. Brown was selected vice president-manufacturing, **Huck Mfg. Co.**, Detroit. He was works manager, Cleveland Pneumatic Industries.

Crane Co., Chicago, has advanced three men. **George Burley,** vice president-trade relations, also becomes acting general manager, plumbing-heating-air conditioning group, succeeding **T. B. Focke,** resigned. **A. H. Storch** was made manager-field sales, Industrial Piping Products Div., and **F. M. Schairer** was named to replace Mr. Storch as manager-engineering sales.

Ernest Joy Lane was chosen regional metallurgist-Midwest area, **Carpenter Steel Co.**, Reading, Pa. Mr. Lane is in Chicago.

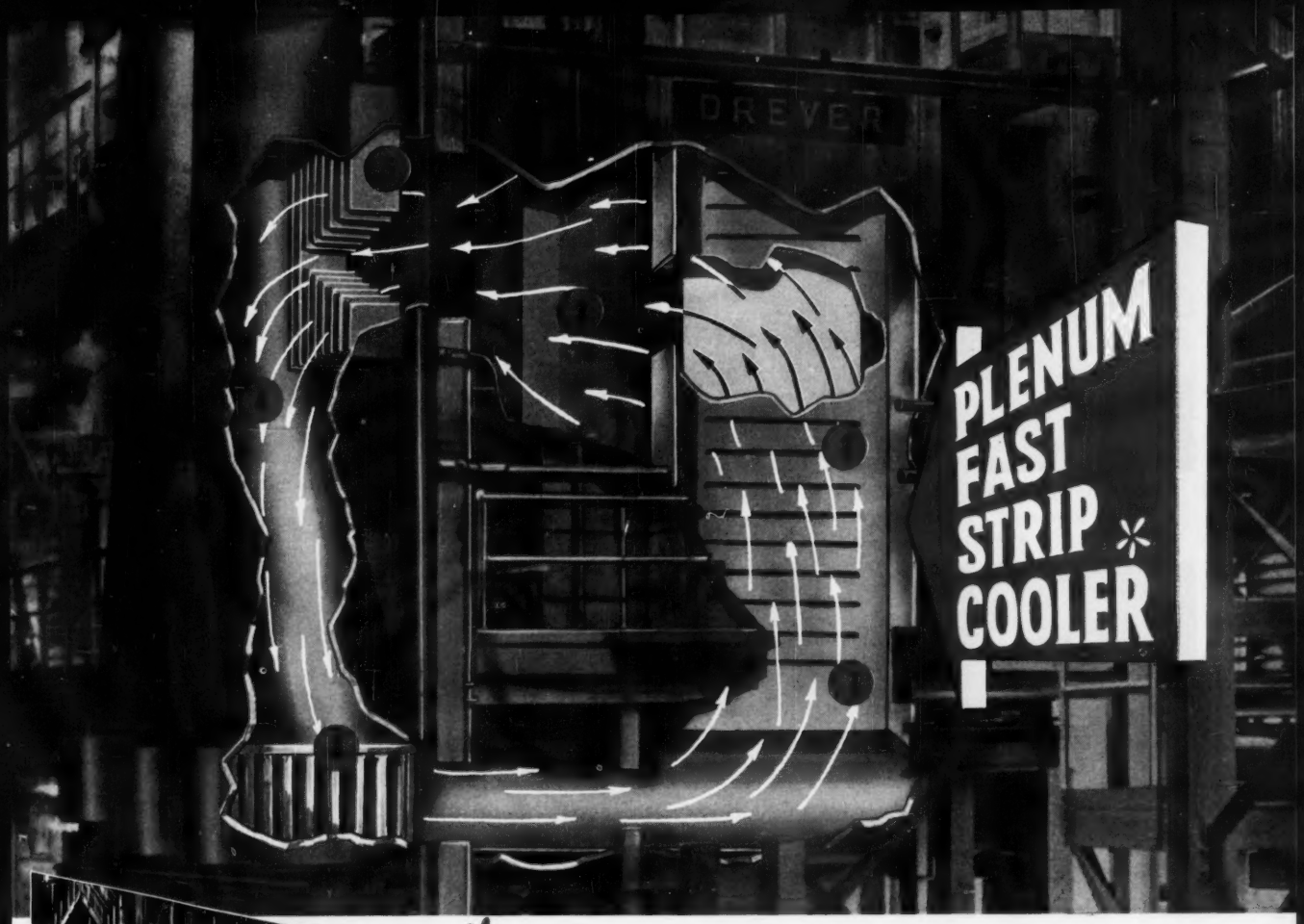
E. Mark Wolf was chosen technical director, **Rea Magnet Wire Co. Inc.**, Ft. Wayne, Ind., a division of Aluminum Co. of America. Former assistant chief engineer, Rome Cable Div., Mr. Wolf will head

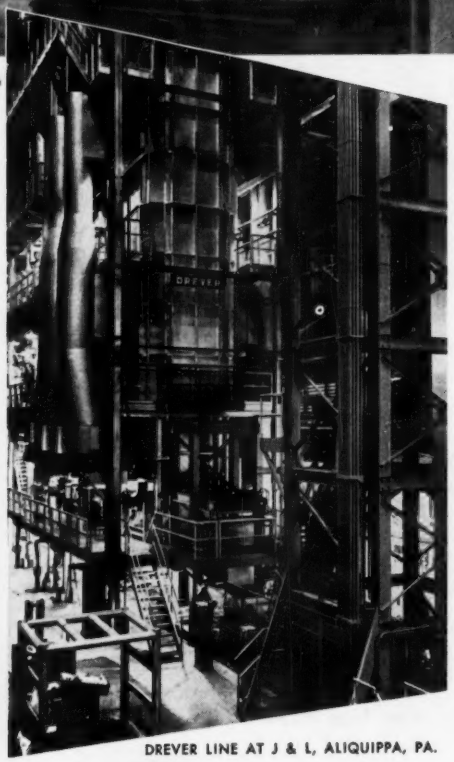
HELLMUTH STRAUSS
Walworth Co. v. p.

I. JOHN BILLERA
U. S. Industries exec.-v. p.

ROBERT J. BAUMANN
Beckman Instruments mgr.

E. MARK WOLF
advanced at Rea





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JOSEPH G. WOPPMAN
Garlock plant mgr.

GEORGE S. McTAVEY
Atlantic-Vulcan sales mgr.

JOHN B. BECKWITH
Associated Spring mfg. post

JAMES E. BORENDAME
joins Fansteel Corp.

WILLIAM E. VOGEL
Atlas chief engineer

THOMAS A. PAKENHAM
Portland Industries v. p.

Rea's expanded research and development activities.

James E. Borendame has been selected director-marketing and public relations, a new post, **Fansteel Metallurgical Corp.**, North Chicago, Ill. Mr. Borendame will coordinate economic and marketing research, advertising, sales promotion, and product public relations. He was with Acme Steel Co., Chicago.

William E. Vogel was named chief engineer-manufacturing research and development, **Dana Corp.**, Toledo, Ohio. He was with Dana Corp.'s subsidiary, Atlas Drop Forge Co.

Robert Davidson was made assistant Western sales manager, Chicago, for **Bliss & Laughlin Inc.**

Alloy Tube Div., Carpenter Steel Co., Union, N. J., appointed **Arvin W. Harrington** manager of distribution, and **Harry A. Hauser** to succeed Mr. Harrington as Eastern regional sales manager.

Thomas A. Pakenham was named vice president-manufacturing, **Portland Industries Corp.**, South Portland, Maine. He was with General Bronze Corp.

Richard W. Powell was made vice president and manager, Electronic Systems Div., **Telecomputing Corp.**, Los Angeles. He succeeds **Berne N. Fisher,** chosen president - general manager, Telecomputing Corp.'s **Value Engineered Products Inc.** Mr. Powell was division manager, Avionics Div., Aerojet-General Corp.

George L. Stroman Jr. was made superintendent, Flanging Dept., **Lukens Steel Co.**, Coatesville, Pa. **Charles H. Brown** was made manager, Research Dept., and **George L. Germain** supervisor of development and training.

Walter G. Haas was made sales manager, **A. R. Purdy Co. Inc.**, Lyndhurst, N. J. He succeeds **Edward A. Haggenmuller,** named assistant to the president. Mr. Haggenmuller also will handle special assignments.

Joseph G. Woppman was named to the new post of plant manager at the Palmyra, N. Y., facilities of **Garlock Inc.** He was manager, Industrial Engineering Dept., Manufacturing Div., and is succeeded by **Borden R. Bond.**

George S. McTavey was made sales manager, **Atlantic-Vulcan Steel Containers Inc.**, Peabody, Mass. He was with Nafton Inc.

John B. Beckwith was appointed manager of manufacturing engineering, **Associated Spring Corp.**, Bristol, Conn. Former spring works manager for the firm's Wallace Barnes Div. at Bristol, he is succeeded by **Arthur J. LeVasseur. John M. Reilly** succeeds Mr. LeVasseur as purchasing agent for Bristol Divisions.

William H. Cantwell, vice president of **Eastern Malleable Iron Co.**, Naugatuck, Conn., was placed in charge of new products and diversification for the company's eight divisions. He retains offices at Wilmington, Del., where he is succeeded as managing director, Wilmington Div., by **James W. Green**, formerly with American Brake Shoe Co.

Roy K. Cannon was made sales manager, Electro-Alloys Div., Elyria, Ohio, **American Brake Shoe Co.** He was Western district sales manager.

Charles H. Smith was made special assistant to the president of **Westinghouse Air Brake Co.**, Pittsburgh. He will handle European affiliates.

OBITUARIES...

Darrell C. Wickson, metallurgist, Axle Div., **Eaton Mfg. Co.**, Cleveland, died Aug. 14.

Forest H. Hartzell, 83, president, **Hartzell Mfg. Co.**, Dayton, Ohio, died Aug. 8.

Herman G. Hetzler, 68, owner and president, **Hetzler Foundries Inc.**, Rochester, N. Y., died Aug. 9.

Saul S. Frankel, 58, president, **Rochester Iron & Metal Co.**, Rochester, N. Y., died Aug. 5

Philip Will, 82, president, **Sterling Range Co.**, Rochester, N. Y., died Aug. 5

Henry G. Wild, 70, president, **Prime Mfg. Co.**, Milwaukee, died Aug. 3.

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Granite City Steel Plans More Expansion Projects

GRANITE CITY STEEL CO., Granite City, Ill., has extended its expansion program to include construction of 61 coke ovens and a high speed, continuous, annealing line to process light gage steel for tin plate.

Construction underway and previously scheduled will increase the firm's annual open hearth capacity from 1,440,000 to 1,740,000 tons by 1962. Additions to rolling and finishing departments will enable Granite City Steel to increase production of cold rolled products, including galvanized and tin plate.

• **Coke Ovens** — The 61 Koppers-Becker, low differential, cross flow, gas gun type, combination, byproduct, coke ovens will be built by Koppers Co. Inc., Pittsburgh. Completion is scheduled for Sept. 1, 1961. Each oven will take 17.2 net tons of coal per charge. The battery will carbonize about 1525 tons of coal a day and produce about 1000 tons of coke. That will add about 80 per cent to Granite City Steel's present coking capacity in two batteries of ovens, and make the company self-sufficient in coke production.

The coke oven battery will be needed to support the company's expanded blast furnace plant, says N. P. Veeder, chairman and president. The plant will be able to produce about 1,134,000 tons of pig iron a year after a blast furnace with a 28 ft hearth diameter and a daily capacity of 1800 tons of pig iron is blown in next October. That furnace (one of two) will have double the capacity of an old furnace it replaces.

Granite City Steel will also alter and add to its byproduct and benzol plants and will expand its quenching station and coke wharf.

• **Annealing Line**—The 42 in., continuous, annealing line will operate at speeds up to 1200 fpm. Machinery for the 375 ft long line will be supplied by Wean Engineering Co. Inc., Warren, Ohio. Scheduled for completion in January, 1962, the line will have a capacity of about 20,000 tons a month.

It will be the third major new unit that is included in the current expansion to enlarge the firm's tin plate facilities. Granite City Steel increased its tin plating capacity one and one-half times last spring with a second, electrolytic, tin plate line. The Waterbury Farrel Foundry & Machine Co., a division of Textron Inc., Waterbury, Conn., is building a Sendzimir cold strip mill for the firm. This nonreversing, 6400 hp unit will finish the cold reduction of the light tin plate gages at speeds up to 3500 fpm.

• **Other Projects**—Also involved in the firm's expansion program are structural and design changes in seven open hearth furnaces; the completion late this year of a 125 ton oxygen plant; and the installation next year of a second, continuous, galvanizing line.

Great Lakes Steel To Build Furnaces

GREAT LAKES STEEL CORP., Detroit, will build a two furnace, oxygen steelmaking shop with a rated annual capacity of 2 million ingot tons. Present open hearth capacity will be partially replaced. The new shop will increase the annual steelmaking capacity of Great Lakes to 4.2 million tons, not counting the capacity of inactive furnaces maintained for operation in periods of peak demand.

Principal facilities of the new shop will consist of the two furnaces, each with a capacity of 250 tons per heat. The shop will be equipped with numerous auxiliary facilities, including electrostatic precipitators.

Thomas E. Millsop, president, says site preparation will begin following the letting of contracts in the near future. It is anticipated that the shop will be pouring steel within 18 months after the start of construction.

The installation is in addition to National Steel's $300 million expansion and improvement program that has been in progress since early 1959. The program includes construction of a new finishing plant for Midwest Steel Corp. in the Chicago area; installation of an 80 in., hot strip mill at Great Lakes Steel; and extensive additions and improvements to facilities for the production of tin plate and cold rolled sheets at the Weirton Steel Div.

Wilton Tool Expands

Wilton Tool Mfg. Co. Inc. is building a $100,000, 12,000 sq ft addition to its plant in Schiller Park, Ill. The firm produces industrial vises and clamping tools.

Two Firms Change Names

United States Bronze Powder Works Inc., Flemington, N. J., changed its name to United States Bronze Powders Inc. T. J. Mullen Sr. has been elected chairman and S. V. Wilson president. J. J. McGurk is secretary-treasurer.

Hi-Shear Rivet Tool Co., Torrance, Calif., changed its name to Hi-Shear Corp. Officers include: President, G. S. Wing; executive vice president, A. J. Kirk; vice president-treasurer, W. J. Carrigan; vice president-manufacturing, A. E. Anderson; vice president-sales, Guy Nash; and secretary, William Halpern.

Walker Buys Five Presses

Walker Stamping Co., Detroit, has completed a major expansion with the installation of five new presses, including two, 800 ton, eccentric units. The presses were designed and built by E. W. Bliss Co., Canton, Ohio.

Republic Gets Plate Mill

Mesta Machine Co., Pittsburgh, has shipped an automatically controlled reversing plate mill with two vertical edgers and auxiliary equipment to Republic Steel Corp.'s Gulfsteel Works.

The Gadsden, Ala., mill will roll reheated slabs into plate up to 126 in. wide and operate as a reversing

rougher to do the preliminary rolling of steel slabs for the hot strip mill. The installation will be controlled by a card programed system.

Landis Buys French Firm

Landis Tool Co., Waynesboro, Pa., has purchased Gendron Freres S.A., Lyon, France, producer of precision grinding machines. In 1958, Landis purchased Landis Lund Ltd., Cross Hills, England. It is believed that Landis Tool Co. and its U. S. and foreign subsidiaries make it the largest precision grinding machine manufacturer in the world. In addition to grinding wheels, Gendron Freres makes pumps for domestic heating units and a subsidiary, Societe de Constructions Mecaniques du Dauphine, manufactures electrical hand tools.

Dow May Buy Jackson Firm

Mueller Brass Co., Port Huron, Mich., has granted Dow Metal Products Co., a division of Dow Chemical Co., a six month option to buy the land, buildings, and equipment of its subsidiary, Sheet Aluminum Corp., Jackson, Mich. Dow Metal Products Co. produces aluminum and magnesium rolled, extruded, and cast products.

Machinery Plant Enlarged

Waterbury Farrel Foundry & Machine Co., Waterbury, Conn., is adding about 250,000 sq ft to its Cheshire, Conn., plant. A smaller and erroneous figure was published in a recent issue of STEEL. The new construction at Cheshire will give a total area of about 300,000 sq ft of manufacturing, administrative, and executive facilities.

Forms Electronics Div.

Fairbanks, Morse & Co., Chicago, established an Electronics Div. which will open a headquarters and new plant in West Hartford, Conn., Sept. 1. John S. Tompkins is general manager of the division which will co-ordinate the company's present domestic engineering, manufacturing, and sales facilities in the electronics field with the importation and marketing of the products made by E. M. I. Electronics Ltd., Hayes, England.

ASSOCIATIONS

Sir Charles Goodeve will be nominated president-elect of the **Iron & Steel Institute**, London, England. He will become president in May, 1961, and will be in office at the time of the organization's proposed special meeting in the U. S. in October, 1961.

Headquarters of the **Alloy Casting Institute** were incorrectly stated in this column recently. They are in Garden City, N. Y.

NEW OFFICES

Commercial Shearing & Stamping Co., Youngstown, established a district sales office at 4010 W. 65th St., Minneapolis 24, Minn. James J. Cullie is district manager.

Polymer Corp., Reading, Pa., opened a branch office at 967 Farmington Ave., West Hartford, Conn. W. H. Wadhams is district sales manager. The firm makes industrial plastics and coating materials.

NEW PLANTS

Standard Magnesium Corp., Tulsa, Okla., opened its new 26,325 sq ft plant at 7501 E. 41st St., that city. With the addition of new equipment, including a 1500 ton press, the company will be able to fabricate a diversified list of aluminum and magnesium extrusions to customer specifications. Standard Magnesium also produces magnesium ingot anodes and operates a magnesium smelter at Tulsa.

Cook Heat Treating Co. of Texas, Houston, is building a plant that will contain 56,000 sq ft of space. The new facility will more than double the space in the two plants now in use.

Firestone Tire & Rubber Co., Akron, will open four new plants in the next few months and plans are underway for building a synthetic rubber producing plant in Port Jerome, France, and a three-plant synthetic rubber complex in Bareilly, India. The four plants nearing completion are in Orange, Tex.; Hopewell, Va.; Calgary, Alta.; and Bethune, France.

CONSOLIDATIONS

James R. Kearney Corp., St. Louis, acquired the **Electrical Engineers Equipment Div.** of Hubbard & Co., Chicago. Three E makes switching and protective equipment, conductor fittings, and bus supports. Kearney makes a wide line of products for the construction, operation, and maintenance of electrical transmission and distribution systems.

Yuba Consolidated Industries Inc., San Francisco, acquired **Coynco Products Inc.**, Tulsa, Okla., and will operate the firm as a subsidiary under the name of Yuba-Tulsa Corp. The Tulsa plant will be expanded and developed into a manufacturing center for Yuba's shell and tube and air-cooled heat exchangers.

Arthur G. McKee & Co., Cleveland, will acquire **Western Machinery Co.**, San Francisco, and will operate the property as a subsidiary. Western Machinery is engaged in the manufacture of equipment for the processing of minerals, chemicals, and other materials; engineering and construction, mainly in the nonferrous metal field; and sale of a wide variety of material handling machinery.

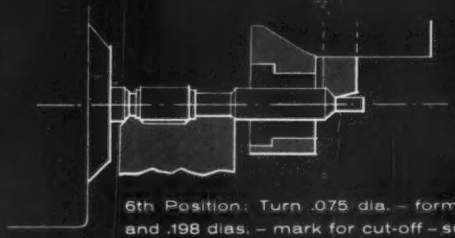
Cessna Aircraft Co., Wichita, Kans., purchased **McCauley Industrial Corp.**, Dayton, Ohio, maker of propellers for small aircraft.

Gedney Electric Co., New York, and **Andrew Terry Co.**, Terryville, Conn., have merged to form Gedney Electric Co. Inc. Corporate headquarters are in Terryville; sales offices are in New York. Officers of the new corporation are: Chairman, D. W. Pond; president, M. W. Heron; executive vice president, G. P. Pond; secretary and treasurer, C. W. Buell. The Andrew Terry firm has been Gedney's sole supplier of malleable iron castings.

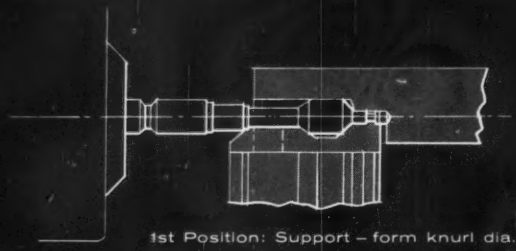
Acme-Gridley Speed & Accuracy...

SLASHES TOTAL MACHINE TIME 76.4%

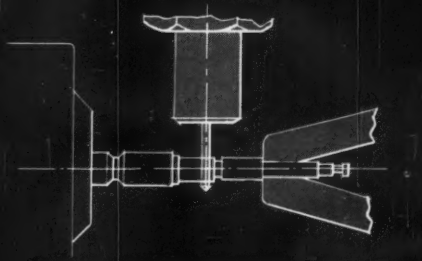
for E.F. Johnson Company



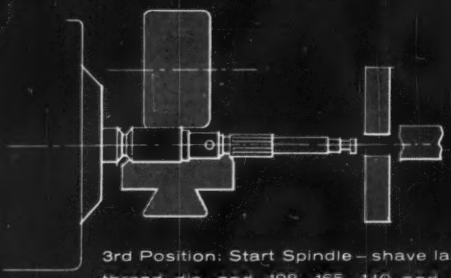
6th Position: Turn .075 dia. – form .165 and .198 dias. – mark for cut-off – support



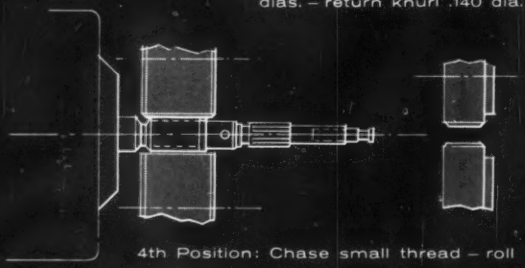
1st Position: Support – form knurl dia., .055 and .075 dias.



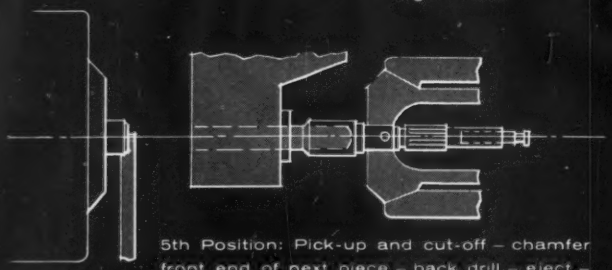
2nd Position: Stop spindle – cross drill – hollow-mill small thread dia.



3rd Position: Start Spindle – shave large thread dia. and .198, .165, .140 and .130 dias. – return knurl .140 dia. face end



4th Position: Chase small thread – roll large thread

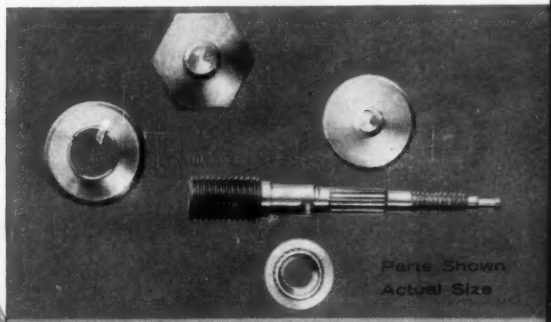


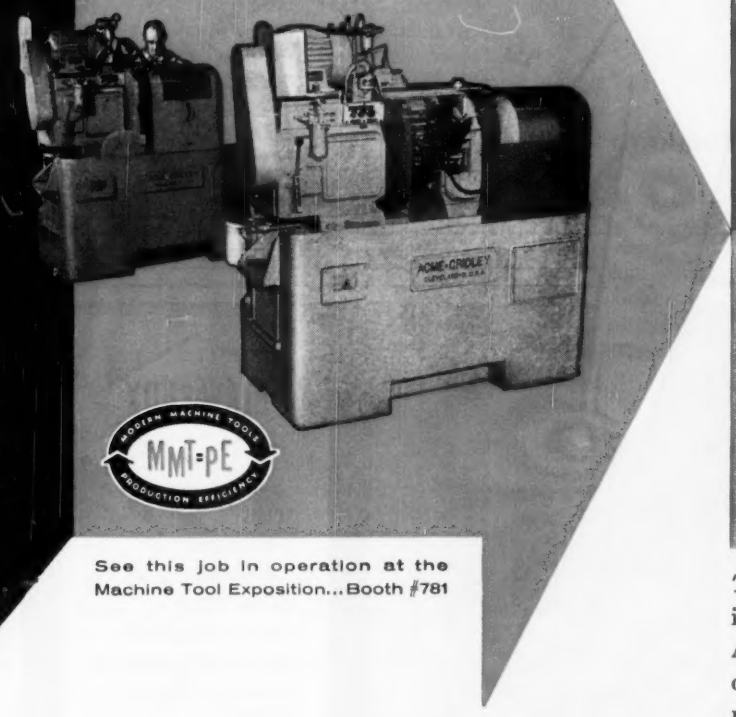
5th Position: Pick-up and cut-off – chamfer front end of next piece – back drill – eject – chamfer front end

Total Machine Time – 5 Seconds

. . . also . . . cost-per-piece is substantially reduced . . . part uniformity and quality definitely improved . . . scrappage all but eliminated.

This is the *record* of two Acme-Gridley 7/16" RA-6 Spindle Bar Automatics installed at the E. F. Johnson Company, Waseca, Minnesota. Producing some 15 intricate parts, like those shown, the rugged and versatile Acme-Gridleys continually meet the rigid specs of this well-known manufacturer; help make high quality products such as the Viking Messenger Citizen's Band two-way radio available at prices that fit the public's pocketbook.





See this job in operation at the Machine Tool Exposition...Booth #781

Tangible production savings, like those realized by E. F. Johnson, are assured with Acme-Gridleys. In your plant, the 7/16" RA-6, or any of the world's most complete line of multiple-spindle automatic bar and chucking machines will show you a new dimension in mass production efficiency.

National Acme

The National Acme Company
189 E. 131st Street
Cleveland 8, Ohio

Sales Offices: Newark 2, N.J.; Chicago 6, Ill.; Detroit 27, Mich.

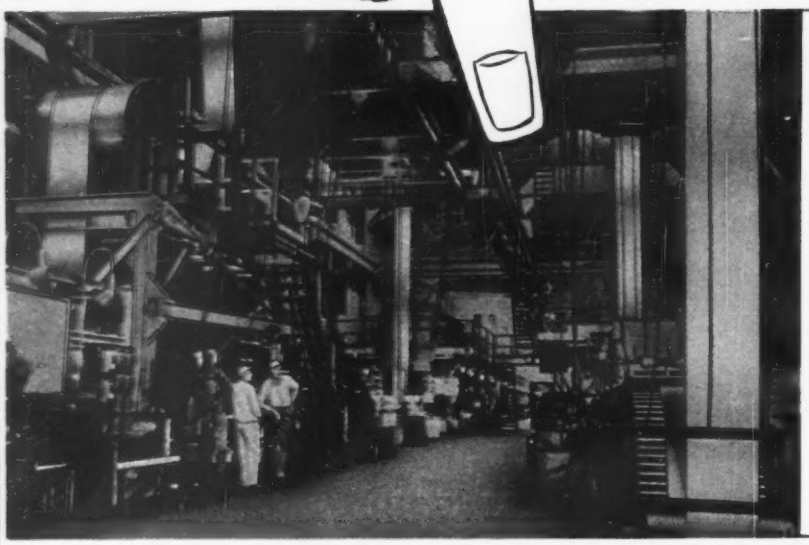
What makes the difference between one galvanizing line and another? How can you save money on the purchase of a Continuous Galvanizing Line? What are the different components that must be considered in the designing of a line?

Aetna-Standard answers these and other questions in this new booklet on Continuous Galvanizing Lines. Other information includes information on the number of lines operating in the world; and pictures of different components of Continuous Galvanizing Lines.

A copy will be mailed promptly upon receipt of your request. BLAW-KNOX COMPANY, Aetna-Standard Division, Pittsburgh, Pennsylvania.

BLAW-KNOX

Aetna-Standard Division
BLAW-KNOX



BLAW-KNOX

THE WORLD'S LEADING DESIGNER AND BUILDER OF CONTINUOUS GALVANIZING LINES

Aetna-Standard Division
BLAW-KNOX

Technical Outlook

EXPLOSIVE SITUATION—Put a palladium or platinum sheath on an aluminum wire, heat it to 1200° F and bang! The combination explodes violently. Although nonexplosive at room temperatures, an exothermic reaction occurs during heating above a critical temperature. Possible uses: Detonators or shock wave sources in electrospark forming.

CONVERT TO CONVERTERS—The Oxy-Fuel lance could transform all open hearths into oxygen converter steelmaking vessels, thinks Air Products Inc., Allentown, Pa. Four lances directed vertically through open hearth roofs would blast oxygen and natural gas on hot metal, creating a type of shallow oxygen converter.

MARKET IN MAKING—Demand for air cleaning equipment for steelmaking will grow markedly as soon as more oxygen fuel lances are applied to open hearths, believes Air Products Inc. (see item above). Faster melting and refining procedures accentuate fume and smoke problems.

BOATS BOOST ALUMINUM—More small pleasure boats are built of aluminum than of wood or glass fiber, claims the National Association of Engine & Boat Manufacturers, New York. The opinion is based on figures for 1958 production.

ALMOST UNCORRODIBLE—An alloy of titanium-palladium (0.2 per cent Pd) outlasted pure titanium in corrosion tests conducted at Argonne National Laboratory, Lemont, Ill. In boiling nitric acid, titanium deteriorated badly in 85 hours while the alloy showed practically no corrosion after 170 days.

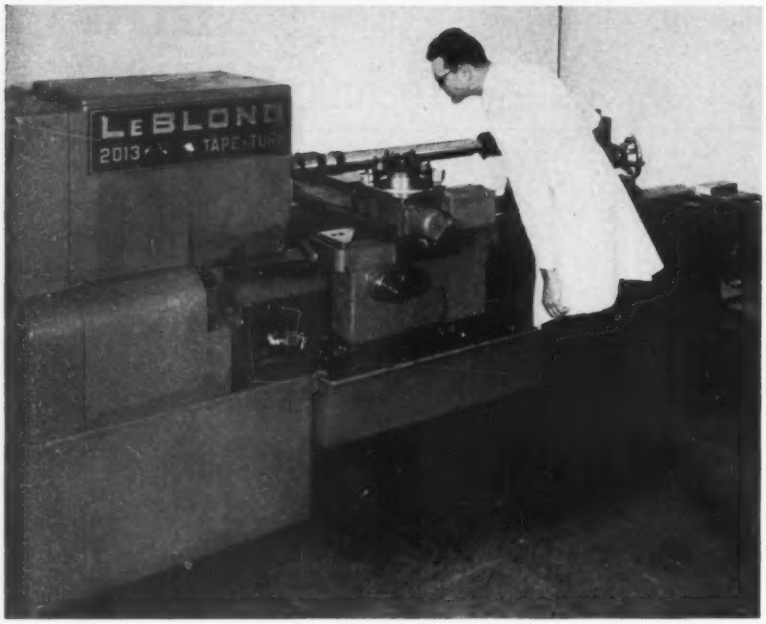
BERYLLIUM STEEL—A new formula for steel containing less than 0.5 per cent beryllium greatly increases resistance to abrasion at high temperatures. A hot work die steel, for example, with beryllium has to be cut with diamond tools. A 0.4 carbon-chromium steel, tempered to 700° F, has a yield strength of 260,000 psi. At 1000° F, the figure is 247,000. Evolved by Mellon Institute, Pittsburgh, with master alloys contributed by Brush Beryllium Corp., Cleveland, the formula is expected to find immediate applications in tool steels, carbon steels, structurals, and high temperature, hot work die steels. Processing involves vacuum techniques.

COPPER CHECKS FATIGUE—Government metallurgists report that of a series of high strength steels tested those that contained copper as a major constituent exhibited the best fatigue properties. Tempering at less than 400° F is recommended.

TITANIUM VS. STEEL ALLOY—Actual tensile strength is the major factor affecting notch sensitivity in titanium or steel alloys, say George Sachs and John Sessler, Syracuse University Research Institute, Syracuse, N. Y. When stress concentrations are added, steel alloys suddenly show much less notch strength at room temperature than at minus 320° F; titanium alloys show a gradual decline of notch strength as temperature is reduced.

WANT BETTER ZIRCONIUM—Fabricators of zirconium alloys must develop better alloys if they expect to share in potential nuclear reactor business, says Atomic Power Equipment Dept., General Electric Co., San Jose, Calif. Especially needed are alloys for superhot reactors (1200°F) with corrosion resistance and strength better than that of 304 stainless, low hydrogen pickup, and resistance to rapid failure from defects.

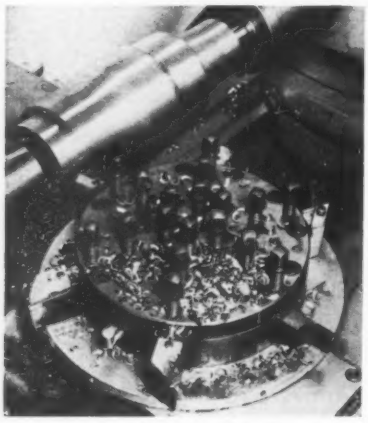
COLUMBIUM NOTE—Here's a way to get around the need to forge and roll columbium and its alloys at 2000° F: First, melt in an inert atmosphere in a consumable electrode arc furnace, then upset forge at 1000° F. Atmospheric contamination at that temperature isn't a problem. The technique breaks down the cast structure of the metal, permitting further fabrication at room temperature, claims Battelle Memorial Institute, Columbus, Ohio.



The handwheels and control levers are gone from this lathe—it gets its full set of cycle instructions from a punched paper tape. The lathe, with a capacity equal to a 16 in. standard, can do straight cuts (either toward or away from the spindle) or it can do contouring of tapers and curves

Tape Control, Lathe Team Cuts Contouring Costs

The punched tape system requires no computer, yet it furnishes continuous path information to the machine. Programing entails knowledge of lathework, plus simple arithmetic



Cutting tools (up to six of them) are preset to length in this turret. The turret index also is controlled by the tape programer

IN AN operation like numerically controlled turning, a prospective user has to decide whether he wants the full luxury of continuous path contouring, or the less expensive but still attractive positioning control. Now, a lathemaker and a control builder have come up with an answer they figure may let the user have his cake and eat it too.

When engineers at R. K. LeBlond Machine Tool Co., Cincinnati, started out to put numerical control on their lathes, they decided on full path control so the machine could do taper and arc contouring as well as straight step turning.

They also knew that they wanted a system that would be as simple and as economical to program and use as a positioning system. To do that, they have tied their machine in with General Electric's new Mark Century control.

• The lathe was developed from the 16 in., heavy duty, standard model.

Redesign for numerical control entailed a new headstock and carriage, both remote controlled. The power train has seven gears mounted on three shafts, interlocked by four magnetic clutches to give 30 spindle speeds—from 22 to 1000 rpm.

A six-tool turret holds conventional cutters, preset to length. Standard carbide wafers are used; small radius wafers are preferred—button nose tooling is not required.

• The control uses static solid state devices, including high speed computer type logic circuits.

Modular design of the control will simplify both installation and maintenance. All electrical circuits incorporate printed circuit boards in plug-in modules, instantaneously replaceable.

GE says the operating cost advantages of the new control can be credited to the fact that most continuous path machining consists of simple slopes or arcs of circles. The control has the capability to order these slopes and arcs without the need for detailed point-to-point instructions. Given the length and direction of a slope or radius and length of arc, the control can translate them directly in terms of machine motion. The control will handle any taper without stepping, and it will blend slopes, arcs, and straight cuts without stepping.

It has a positioning accuracy at the tool point well within ±0.001 in. on straight cuts, including slopes, and ±0.003 in. on a 10 in. radius.

• All the tools a programer needs are a pencil, sine-cosine tables (or a slide rule for figuring slopes), and a knowledge of proper cutting feeds and speeds.

The programer plots the path to be traveled by the center of curvature of the tool tip radius. His first instruction on the worksheet is to tell what the path will be. P1 indicates a straight line. P2 is for a clockwise circular arc, and P3 is

for a counterclockwise arc. P4 indicates a dwell.

Next, he describes the distances in the X and Y directions that the tool has to move. For example: X+7.030 says that the tool is to move parallel to the spindle (X axis), away from the headstock toward the tailstock (+), a distance of 7.030 in. Cross feed on the Y axis is programed the same way.

When a slope or arc contour is to be cut, the programer simply enters the proper amount and direction of X and Y axes data, then tells the slope of the line to be taken during the tool travel. The sine (code L) and cosine (code K) of the angle are entered in the worksheet to denote the angle of travel. If the path is to be an arc, rather than a straight line taper, the P2 or P3 indicate the direction of arc.

Feed is programed in inches per minute. The maximum possible feed is 199.9 ipm. Speeds are coded with an instruction such as S35; that indicates clutch position five in speed range three, and it equals 538 rpm.

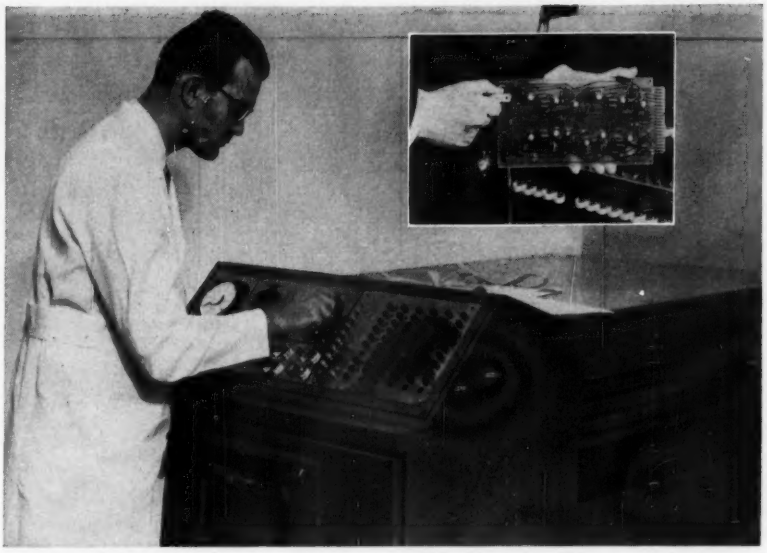
A typical line on the worksheet might contain this information: P1 X−1.5013 Y+0.125 K0.99656 L0.08281 F003.9 S.35.

That line would be entered on the worksheet, then typed directly on a tape-producing typewriter. (Total programing time, including tape punching and proving, averages 5 minutes per line.)

The line translates this way: P1 (straight line), X−1.5013 (cutter is to move toward the headstock 1.5013 in.), Y+0.125 (cutter is to withdraw from the work centerline by $\frac{1}{8}$ in.), at the angle whose cosine is 0.99656 and whose sine is 0.08281 (4 degrees, 45 minutes), at a feed of 3.9 in. a minute, and at spindle speed of 538 rpm. (Normally, both speed and feed changes are programed in advance of the cut.)

That's all there is to it. In addition to those commands, the programer can call for a change of tools by indexing the turret, for a program stop, and for several other miscellaneous machine functions.

LeBlond says it plans to sell the complete package (machine, motor control, and the tape control unit) at a relatively low price. Example: $69,000 for this 2013, 54 in. center distance lathe setup.



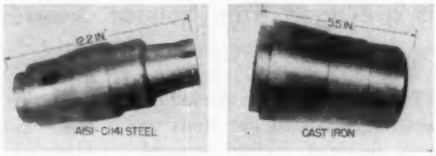
This control panel, and the box behind it, house the complete GE Mark Century numerical control system for continuous path machining. The operator is adjusting a dial that permits him to over-ride the taped cross feed. The plug-in printed circuit boards (see inset) help trim the size of the control and simplify maintenance

Except for the tape punching typewriter, no other equipment is needed. The company says it is offering fully automated turning at a cost even a small firm can afford.

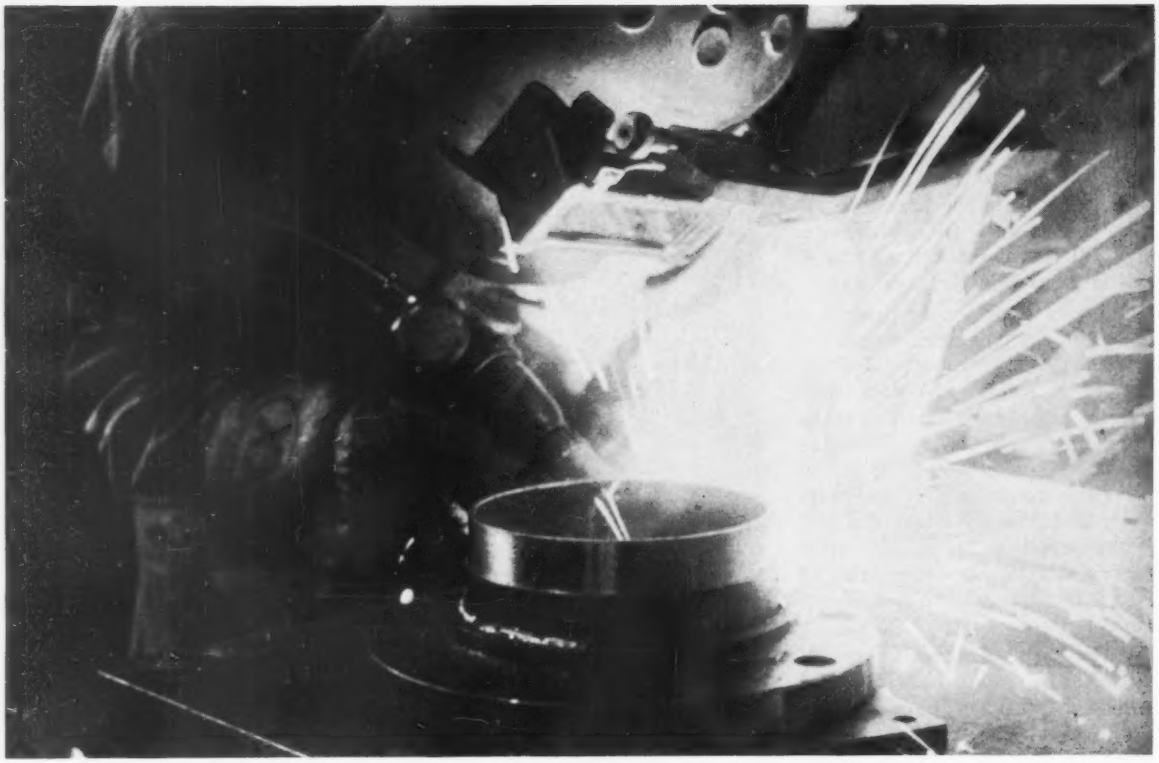
• If you'd like to have a copy of this article, write to Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio. You may win $1000 by using material like this in STEEL. For details, see the Servicenter, Pages 5 and 6.

Tape Slashes Tracer Time

LeBlond engineers ran time tests for these two parts. They drew and made templates, programed tape from the part drawing, set up both machines, and ran off two lots of six pieces each. Here are the results.



	Tracer (Minutes)	Tape (Minutes)	Tracer (Minutes)	Tape (Minutes)
Template Drawing or Job Programing	90	496	45	180
Template Fabrication or Tape Cutting	1,500	124	960	45
Setup Time	90	15	84	15
Floor to Floor Time	112.8	125.52	54.12	35.88
Total Time per Lot	1,792.8	760.52	1,143.12	275.88
SAVED:	17 HOURS		14 HOURS	



Operator employs one of the flux-gas-shielded, metal arc devices which experts at International Harvester find advantageous in joining farm equipment parts

Have You Considered Semiautomatic Welders?

The newer gas shielded metal arc processes aren't used enough, say International Harvester researchers. They give results averaged from tests at several plants

"INDUSTRY hasn't awakened to the advantages it can get from today's gas shielded, metal arcwelders."

That's what G. Christopher, welding engineer, and R. C. Becker, assistant general supervisor of welding research, International Harvester Co., Chicago, told participants at a meeting of the American Welding Society in Los Angeles.

Reasons: Not enough comparison data with conventional processes are available, and designers have not fully realized the advantages of welds made with the new methods.

International Harvester has been collecting such data and testing gas-shielded systems for nearly a decade. Here are some of the advantages it lists:

- Fillet welds made with the newer systems are stronger than those of E-70XX manual electrodes.
- Less weld metal is needed to complete joining.
- Gas-shielded, metal arc processes permit much faster welding than manual electrodes.

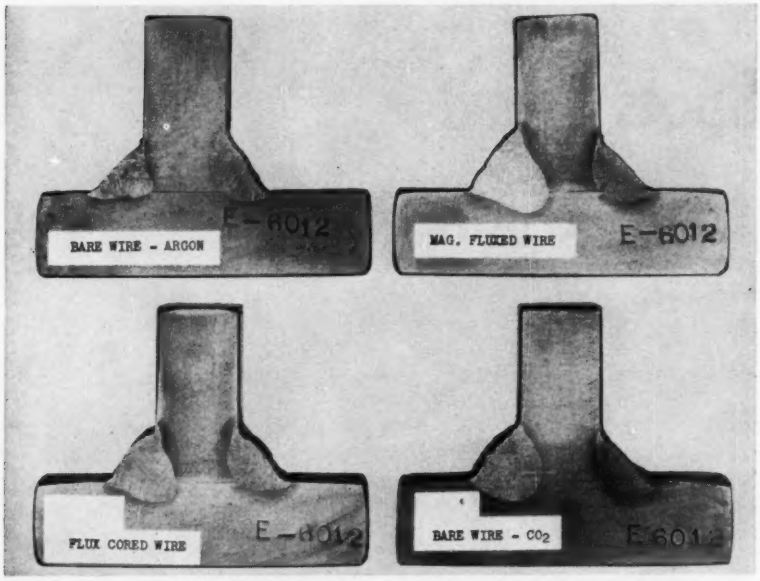
- **Factors of arc time, materials, joint geometry and fitup, welding position, and cleaning determine which process is best, costs least.**

The newer devices tested by International Harvester can deposit two or three times as much metal in a given time than a covered electrode, say Messrs. Christopher and Becker. Rates of 5 to 20 lb an hour compare favorably with 2 to 11 lb an hour for older methods.

An important part of efficiency is the welding speed on fillets. Tests showed that the newer methods were faster; the CO_2 bare wire combination made the best showing. Here is a partial comparison of welding speed developed by the tractormaker:

Process	Arc Time Per Inch
E-7018 (7/32)	0.105
Bare CO_2	0.045
Flux cored wire	0.050

Faster welding speeds are partly offset by the higher material costs for the gas-shielded metal arc methods—electrodes, wire, gas, and powder flux. (Other factors like cleanup time must also be considered.) Bare wire CO_2 method costs were among the lowest for semiautomatics.



Test pieces illustrate typical penetration of various systems on fillet welds (above) and bare plate (below). Comparisons below (left to right): Flux core, bare wire CO_2, magnetic fluxed wire, and three coated electrodes

Bare wire argon costs were the highest, says the company.

For example: A 7/32 in., E-7018 electrode will lay down a fillet for 0.0034 cent per inch; bare wire argon for 0.0056 cent; magnetic-fluxed, 3/32 in. wire runs 0.0048 cent, claim the investigators.

• The newer processes offer deeper penetration than other methods.

Most people assume that manually deposited fillets extend only to the intersection of joint members and base their calculations on a throat dimension, say Messrs. Christopher and Becker. The newer processes push the fillet fusion point well into the base plates. To get maximum benefit from the semi-automatics and automatics, designers ought to recognize the greater efficiency and cut down on materials. (Lloyds of London already recognizes the advantages; the American Welding Society is considering the approach.)

How far your weld penetrates depends on plate thickness, travel speed, and current or wire feed setting. In a series of tests, International Harvester deposited some beads on a plate which adequately demonstrates the effects of such factors. Conclusions: Penetration decreases with an increase in plate thickness; depth of penetration decreases as welding speed increases.

Strength of a fillet weld depends on strength of deposit metal, method of stressing, and throat dimension. Fillet penetration is similar to that of the bare plate examples, but positioning of the electrode by the operator is important. For example, weld strength can drop from 25 to 40 per cent if the electrode almost parallels the base plate instead of bisecting the fillet angle.

In comparing manual and semi-automatic methods, Messrs. Christopher and Becker used throat dimensions, since the practical weld strength and stressing methods in the tests were equal.

More benefits can be realized through careful, proper modification of joint design. Increasing penetration can be of great value, but burn-throughs are a problem.

• Summing Up — High deposition rates and faster welding speeds call for better joints, improved fixturing, and welders who can take the increased speed without fatigue. (Otherwise, International Harvester suggests, go to automatics.)

In exploiting increased penetration, small groove angles, depths in groove welds and fillets should be specified. Such steps will extend the benefits of the newer processes beyond what you can get from increased deposition rate alone.

DO equipment makers agree with IH experts? STEEL polled several:

"IH people have shown good scope, objectivity. We agree in general—our only disagreements are on some minor details."—John Galbraith, manager, electric welding development, Linde Co., a division of Union Carbide Corp., New York.

"A well presented view, but without cost data on multipass welds, where the flux cored method would show up quite well. Cost differences between CO_2 bare wire and flux cores narrow as wire sizes increase."—A. F. Chouinard, director of research, National Cylinder Gas Div., Chemetron Corp., Chicago.

"The article seems pretty factual to us although we haven't been able to check out all data. A strong fillet with less weld metal is an important point."—Emmett Smith, chief engineer, Electrodes Div., Lincoln Electric Co., Cleveland.

"The presentation is good. It is an excellent guide for an engineer, but other acceptance factors might have been emphasized more. Inspection is a drawback to deep penetration fillet welds, which the better plants manage to solve."—G. R. Rothschild, assistant director, metallurgical research, Air Reduction Sales Co., a division of Air Reduction Corp., New York.

Gearmaker Spots Trend to Precision

As the operator watches, the twin wheels of this custom built Maag grinder put the finishing touches on a large helical gear. The machine will handle either helical or spur gears up to 74 in. in diameter and up to 18 in. face widths. It holds accuracies of 5 arc seconds

As customer requirements get more critical, one company is supplying more hardened and ground gears than ever before. A new plant gets part of the precision credit

FIVE YEARS ago, production men at Philadelphia Gear Corp. turned out almost no precision hardened and ground gears for medium and high horsepower applications. Although gears of that type have long been produced in Europe for specialized applications, Philadelphia Gear management didn't see sufficient demand for them in their big market, general industrial power transmission.

Today, it's a different story. Increasing demands for precision and for higher load carrying capacities have created a production balance in which 25 to 30 per cent of all gears the company makes are hardened and ground.

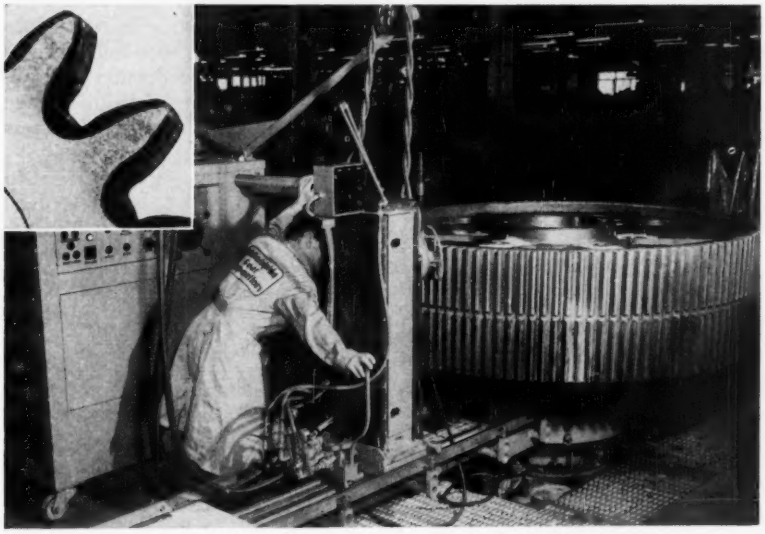
Russell C. Ball Jr., president, feels that demand will continue to grow. "In two or three years, we expect about half our output will be in hardened and ground gears."

• **New Plant Helps**—To increase its ability to maintain closer tolerances without drastically increasing production costs, the company built, and recently moved into, a plant in King of Prussia, Pa., about 16 miles from downtown Philadelphia. The plant has about 120,000 sq ft of manufacturing space; another 60,000 sq ft are used for offices, engineering, research, and storage.

Mr. Ball says: "As a result of new machine tools and related testing equipment we've installed, we have been able to cut our tolerance limits by 75 per cent—from about 20 arc seconds to 6 arc seconds. New equipment is only part of the story.

"We have found that environmental conditions must be rigidly controlled to produce these results. Special machine tool foundations

This is a general view of the temperature and humidity controlled grinding room with its nine new machine tools. The room is also kept dustfree by maintaining a slightly higher pressure inside than outside, forcing all dust out



This new induction hardening machine produces a closely controlled depth of hardness over the full tooth contour (see insert at left). A shaped inductor traces across the face of the teeth. The machine can handle 8 to 180 in. diameter gears with face widths up to 20 in.

were designed to provide an absolutely stable machine base and to isolate the machines from all other shop vibrations. All precision tooth grinding is done in shop areas which are air conditioned, dust and humidity controlled. In this way, dimensional deviation due to temperature change is minimized as a source of error.

"Further, our production capacity is about 25 per cent greater than it was before."

• **Market Niche**—Mr. Ball reasons: "In the competitive gearing business, we must continue to supply those users whose needs are for less critical gearing. But with the trend toward precision continuing, we think this market will be only half of our potential."

The rest will be for those applications in which precision and load carrying are most important. Mr. Ball figures the critical jobs will include those in large steel mill drives where high loads exist and where reduced backlash enhances reversing properties; radar drives; high speed drives such as those in gas turbines or in air conditioning; marine drives; large pump drives; and in equipment like flying shears and printing presses where timing is critical.

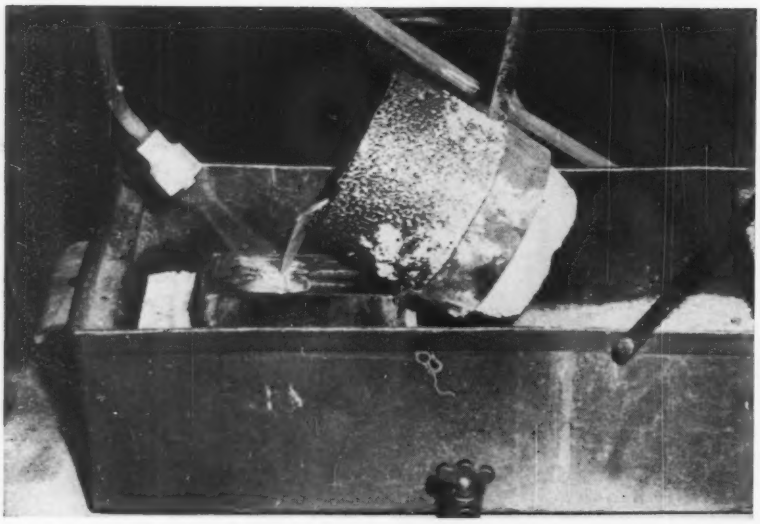
• **Precision Examples**—Some of the jobs the company has finished are indicative of precision needs.

1. The company has made five gears with 141 in. pitch diameter for use in ICBM radar detection installations. The total cumulative error around the gear periphery was within 10 arc seconds (0.0035 in.).

2. In a gear train (again for radar) five gears had to be assembled and then checked for backlash. The checks were made with the output pinion rotated 90 degrees between measurements. The maximum backlash variation was not more than 0.004 in. In five similar gear trains, the difference between the tightest and loosest spot of all 25 checks was 0.013 in.

3. In 20 gears that measured 56.6 in. pitch diameter (three-pitch), the tooth to tooth error was held to 0.0001 to 0.00015 in. The total cumulative error was 7 to 8 arc seconds (0.0007 to 0.0008 in.). All teeth in the 20 gears were of uniform thickness within 0.001.

4. Less dramatic, perhaps, but of more importance to most users, is the increasing precision the company is supplying in its bread-and-butter products like speed reducers. For example, by going to hardened and ground gears in its reducers, Philadelphia engineers have upped the load carrying capacity. Where there is a requirement for space saving, this has meant that the new units can be made smaller—they weigh 30 per cent less than predecessors of equal capacity. The new gears run quieter, backlash is reduced, vibration is minimized, and the better tooth profile has improved gear life. Because of the reduction in material weight, the new reducers can sell for the same price as the old ones did.



Small slab is clad in the laboratory by heating with a flame that carries volatile flux, then casting molten copper on the fenced-in upper surface

Gas Flame Delivers Flux In Metal Cladding Process

BIMETALS may solve the nation's problem of getting all the copper it needs and permit domestic fabricators to meet foreign competition with lower prices, says W. L. Ulmer, president, Automatic Gasflux Co. and Superior Flux Sales Co., Cleveland.

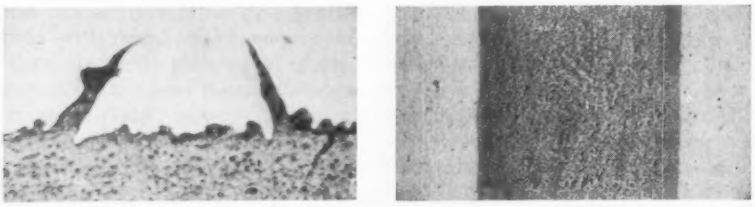
A process developed by Mr. Ulmer copper clads steel slabs or makes copper-stainless sandwiches. Copper content can be as low as 10 per cent.

• Cladding is applied by casting molten copper on a thick, heated slab of steel.

A sheet steel barrier is built around the upper surface of the slab to confine copper to the area being coated. Then the top of the slab is heated to about 2100° F with a flame that contains vaporized flux, and the fenced-in area is filled with molten copper.

When the copper solidifies, it is said to be bonded inseparably to the steel. A vital factor in the process, says Mr. Ulmer, is the volatile, liquid flux, which leaves no residue, and permits the two dissimilar metals to fuse, forming an alloy at their interface.

The slabs can be reheated and rolled into strip on conventional hot mills and worked with conventional blanking, forming, and drawing dies, without parting the cladding from the base metal.



Photomicrograph (left) shows intimate interface and penetration of copper into surface imperfections on the steel slab. Three layer laminate (right) combines the heat conductivity of copper with desirable qualities of stainless steel

• Process variations: Double clad slabs, copper clad bars, and copper-stainless sandwiches.

Double clad steel is produced by coating one side of the slab by the flux-flame method, then turning it over, heating the skin on the opposite side to about 2100° F, and applying liquid copper. The underside of the slab doesn't reach a temperature high enough to melt the copper applied earlier. The process can also be used to clad steel bars with copper, says the developer.

The bimetal sandwich is produced by supporting two stainless steel slabs in a vertical position (with their planes parallel), and casting molten copper between them. The three layer laminate can also be rolled on conventional mills.

• Stainless steel can also be used as a cladding material for carbon steel slabs.

Some of the stainless clad slabs were rolled on an experimental mill at Case Institute of Technology, Cleveland, and later on a production mill that had been rolling stainless steel. The production mill reduced 1½ in. thick slabs to 14 gage strip; no special preparation was needed.

Analysis of the stainless clad strip at Herron Testing Laboratories Inc., Cleveland, showed that properties and qualities of the 18-8 stainless had been retained. No migration of carbon from the mild steel was apparent.

• Bimetals made by the process are said to have many applications.

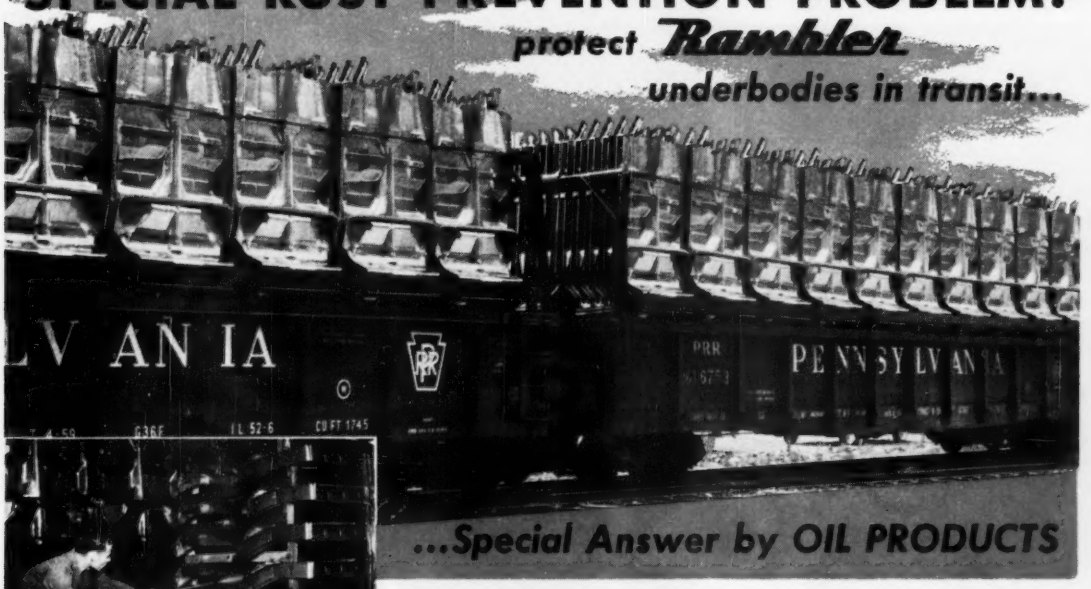
Copper clad sheets can be drawn, formed, or made into tubing, says Mr. Ulmer, and used in many mass produced items, such as automotive radiators and hot water storage tanks. And stronger commutators for electric motors can be made from copper-steel plates.

The copper-stainless steel sandwich would be applicable to cooking utensils and certain aircraft and missile components because of copper's excellent heat conductivity.

Stainless clad mild steel could be used for automobile wheel covers or other decorative items, reducing material cost. The material would be adaptable to deep drawing; the mild steel would support the stainless at all points, to minimize fracturing, says Mr. Ulmer.

SPECIAL RUST PREVENTION PROBLEM:

protect *Rambler* underbodies in transit...



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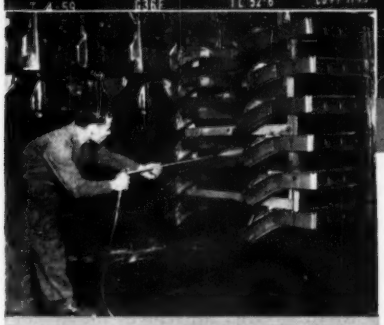

Rust preventive is sprayed on underbody bundles on loading dock. Note clean floor, small amount of absorbent required.

Carloading crane picks up bundle as sprayer covers bottom underbody. Thixotropic RP 252 gels on contact; does not run off.

Rust preventive is sprayed direct from drums through wide-angle spray nozzle. Last RP 252 goes on as bundle is lifted toward gondola car.

THE PROBLEM: Protect bare steel underbodies for up to two weeks outdoors in open gondola cars; keep rust preventive from running off on application; apply without fume hood or spray booth; make preventive quickly and completely removable; keep costs down.

THE SOLUTION: Frank Dreher, Budd metallurgist, Gary, Indiana, called on Nalco's Oil Products Division and other chemical suppliers for action. Oil Products developed RP 252, a thixotropic liquid corrosion inhibitor for this job. It is a high-flash-point, virtually colorless, odorless material that gels on contact with underbody metal. Spray coating at the loading platform is quick, clean, virtually fume-free. One man handles the entire operation; does not need protective mask or clothing.

THE RESULTS: Mr. Dreher (pictured left above with R. M. Kearns, Oil Products Sales Engineer) feels that the problem is solved satisfactorily. Rust prevention is complete; chemical costs are below previous material levels; substantially less oil-absorbent compound is required on floors in the spray area; American Motors removes RP 252 in an alkaline wash in one minute; and no residue remains to hamper welding or painting.

If you have rust prevention problems that need special skills and extra *willingness*, call on Oil Products . . . We would like to duplicate the Budd-American Motors results for you.

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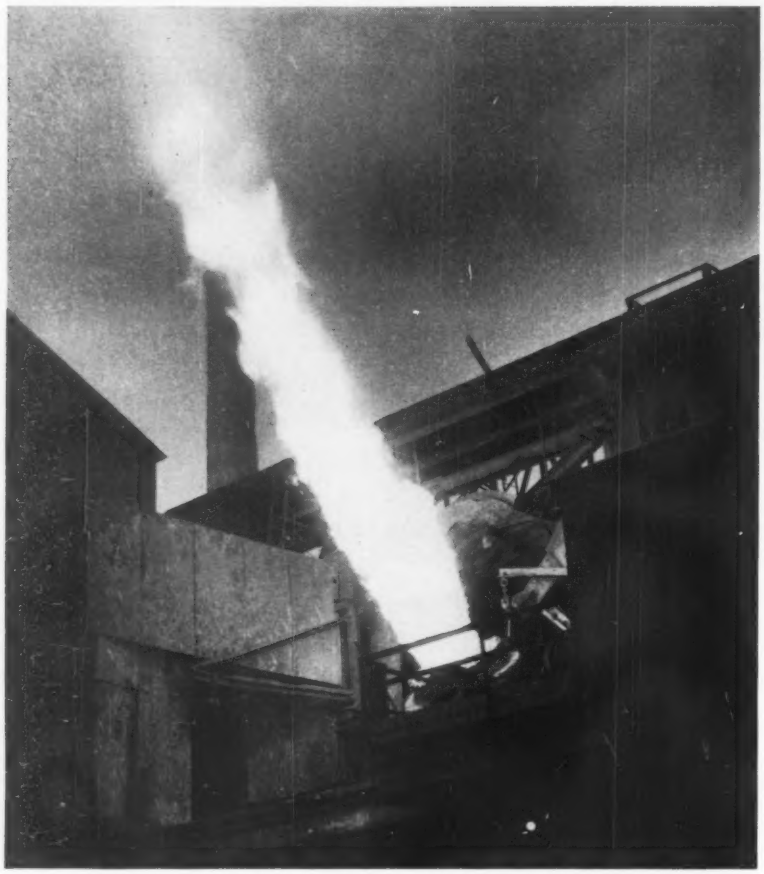

Air blown bessemer makes steel at Steubenville. Oxygen-steam blowing is expected to produce clearer flame characteristics and make for easier end point control

Bessemer Process Updated With Steam-Oxygen Blowing

Practice permits Wheeling to make steel low in nitrogen and phosphorus in its bessemer converters. It will also improve end point control and make for faster heats

ACID CONVERTERS blown with a mixture of steam and oxygen will permit production of better steel at the Steubenville Works, Wheeling Steel Corp., Steubenville, Ohio, says Gordon M. Yocom, assistant to the general manager at the plant.

Oxygen for the process will come from a new, 400 ton a day facility, owned by Wheeling Steel and Hydrocarbon Research Inc., New York.

• The oxygen supply will be shared by the bessemers and open hearths.

The oxygen plant will be operated by Mingo Oxygen Co., which is owned jointly by Wheeling Steel and Hydrocarbon Research. Expected to go on stream late this year, it will turn out liquid and gaseous oxygen and high purity argon.

About half the oxygen output will be used in Wheeling's two, 15 ton, acid bessemer converters. The rest will be used in the company's open hearths, for combustion and decarbonization (roof lances will be installed in the furnaces). The argon will be marketed by Hydrocarbon Research.

• Tests at the Steubenville plant proved the feasibility of the oxygen vapor process.

The company's two converters have a rated capacity of 57,000 tons a month. The product: Skelp billets for continuous weld pipe and slabs for sheets of drawing and forming quality. About half the ingot output is of normal phosphorous content; the rest is dephosphorized as it is poured into the ladle.

The low phosphorous steel is said to excel the untreated metal, but its nitrogen content (in air blowing) was about 0.015 per cent. That limited its application.

In 1955, an experimental run of 160 heats was blown with a steam-oxygen mixture to make steel of low phosphorous and nitrogen content. During that run, operating techniques were established, and the dephosphorizing treatment was improved.

A second experimental run (720 heats) was made in 1957. Product improvement and reasonable conversion costs proved the process practical.

• A half-and-half mixture of oxygen and steam is introduced through tuyeres at the bottom of the converter.

The 50-50 mixture reduces heat to heat cycle time from 12 minutes to 9; blowing time is 7 minutes vs. 9 for air blowing.

High purity oxygen, compressed to 200 psi and fed through an 8 in. main line, flows at 3800 standard cu ft a minute. Steam at 220 psi passes through a 6 in. line at 317 lb a minute.

Oxygen from the main line is reduced to 100 psi and heated to 300° F in a steam heat exchanger, to pre-

Better products through better methods and steels

How zinc-coated steel cut 5 steps from automotive lamp housing fabrication.

When automotive head and tail lamp housings were drawn from cold rolled sheet steel and then zinc-plated or painted, as many as five or six handling and cleaning steps were required to make them corrosion-resistant.

Now, fabricated from Weirkote continuous-process zinc-coated steel, the housings go directly from the press to the assembly line. Further processing is unnecessary because Weirkote can be worked to the limits of the steel itself without chipping or flaking its corrosion-resistant zinc surface.

It's this superiority that caused the automobile industry to increase its consumption of zinc-coated steel more than 700% in five years; to use it in such varied applications as mufflers, window channels and the understructures of unitized bodies; to take advantage of developments such as differentially zinc-coated steel that can be welded at top production-line speeds.

A major supplier is Weirton Steel Company—producer of Weirkote continuous-process zinc-coated steel sheets and many other excellent steels that are improving products, methods and profits throughout industry.

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Weirkote will also be available in 1961 from National's Midwest Steel Division, Portage, Indiana.

Its Shaft is Stainless . . . for Strength to Spare!

New 17-4 P.H.* Grade of Stainless from CSS Assures Long Service Life for Vital Part of Outboard Motors

Photos, courtesy McCulloch Corporation, Manufacturers of Scott Outboard Motors.

With quality uppermost in mind, design engineers at McCulloch sought the best possible material for the drive shafts of their newly-designed outboard motors. On consultation, metallurgists at The House of Stainless recommended the new 17-4 P.H.* grade of stainless steel for its outstanding qualities:

1. Corrosion resistance equal to the 18-8 grade.
2. Superior wear resistance (Rc 40-44).
3. High strength (up to 200,000 psi).

Tests quickly proved how well this special grade fit into their quality program.

With more than 30 different grades of stainless steel, there is *one* that meets each specific need. That's why it makes sense to utilize the experience of CSS metallurgists in making sure you get the grade best suited to your requirements.

Remember . . . our diversified stocks of stainless steel enable us to back up this metallurgical assistance with prompt delivery of the *proper* material . . . whether it be a standard item or a special like the new 17-4 P.H.* grade.

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vent condensation and erosion in the tuyere area when oxygen is mixed with steam. The oxygen is admitted to the mixing chamber through a hydraulically operated valve, driven by a ratio control regulator.

• **The process is said to make steels comparable to open hearth grades.**

Using hot metal of an analysis normally used in the acid bessemer process, oxygen vapor blowing produces steel containing an average of 0.0018 per cent nitrogen. That is lower than the 0.002 to 0.005 per cent normal range for low carbon steels from the open hearth, says Mr. Yocom.

Hydrogen content averages 0.3 to 0.4 part per million — about the same as air blown bessemer or open hearth steel made for Wheeling's flat rolled products.

End point control is said to be easier with oxygen steam blowing. Flame characteristics are clearer, and visual judgment of temperature levels and end point for 0.03 to 0.04 per cent carbon are more positive than with air blowing, says Mr. Yocom.

• **Initial heats, blown with high oxygen ratios, caused rapid bottom deterioration. Several steps were taken to extend refractory life.**

Bottom building and drying practice were improved, and the best available refractories were installed. And bottom wear decreased when the 50-50 oxygen-steam mixture and normal bessemer blast pressure were used.

Blast volume is reduced because less inert gas is present; the tuyere area was reduced about 50 per cent. Blowing time was decreased and bottom life was extended by changing the size and layout pattern of tuyere holes.

• **The method is said to increase steel yield and produce less fumes than air blowing.**

A yield increase of 0.50 to 1.00 per cent, observed in the experimental heats, was apparently caused by reduced sloppage and spitting, and by smaller losses of blown metal in the slag.

Fume emissions are less than for air blowing but greater than in steam-oxygen blowing of basic converters in Europe.

Worker sprays pallet load of six underbodies which is suspended from an overhead crane. No spray booth or fume hood is needed, and coating is easily removed with an alkaline wash

New Chemical Inhibits Atmospheric Corrosion

RUSTING of American Motors' Rambler underbodies during shipment in open railway cars and outdoor storage has been eliminated with a new inhibitor.

Called RP 252, the chemical was synthesized for the Automotive Div. of Budd Co., Gary, Ind., by the Oil Products & Chemical Div. of Nalco Chemical Co., Chicago. The Budd division turns out 1200 to 1600 Rambler underbodies daily.

• **Sets Up a Gel**—In protecting vulnerable spots on newly fabricated underbodies, such as wheel wells and edges, the material sets up a gel that will not drip off at high speeds in open railway cars or under tough weather conditions.

Applying the material doesn't require elaborate preparation, or unusual safety measures. It can be applied without a spray booth or fume hood and can be removed in less than 1 minute in an alkaline wash.

The inhibitor is a transparent oil-base thixotropic fluid that gels on contact with the underbody metal. It has a high flash point (300 to 350° F) and is virtually odorless.

In the spraying operation, bundles of six underbodies held together by steel strapping are brought to the loading dock for hoisting into gondola cars. As an overhead crane picks up the strapped bundles, a worker sprays the parts with a quick over-all protective coating. The inhibitor is fed directly from 55 gallon drums.

• **Has High Covering Power**—Frank Dreher, Budd metallurgist, says that one drum of RP 252 sprays an average of 380 units. The previously used product covered about 200. The increased covering power more than offsets a slightly higher cost per drum. Less room is needed for storage of the material and less handling is necessary.

Mr. Dreher also points out, that it had been necessary to buy, store, and handle large quantities of a sawdustlike absorption material which was spread around the spraying area to keep it dry and slipproof. The new preventive has virtually no drainoff, the use of the absorption material has been considerably curtailed.

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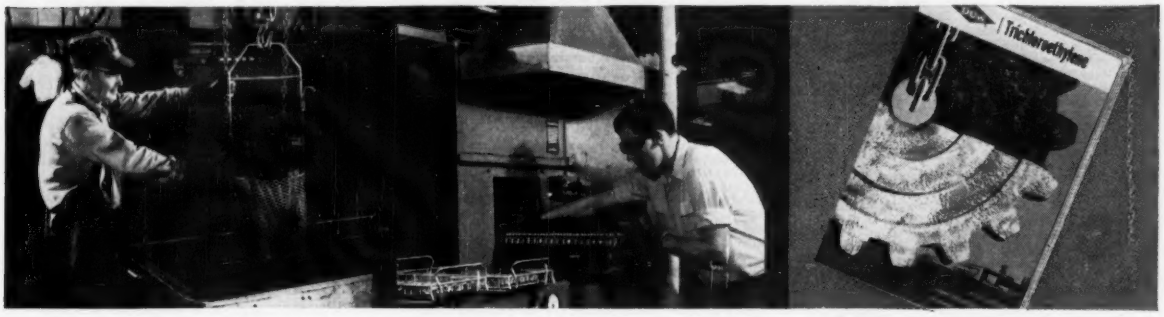
COLOR CODED—Drums for each of Dow's chlorinated solvents are distinctively colored for easy identification—even from 100 feet away. NEU-TRI, for example, comes in blue and white drums. To help you select the right solvent for your operations, call your distributor of Dow solvents.



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DETROIT—Western Solvents & Chemicals Company (C M P)
DETROIT—Whitfield Chemical Company (P)
ESCANABA—Haviland Products Company (C M P)
FERNDALE—Manpro Corporation (C M P T)
GRAND RAPIDS—Haviland Products Company (C M P)
GRAND RAPIDS—McKesson & Robbins, Inc. (C M P T)
GRAND RAPIDS—Wolverine Solvents & Chemicals Co. (C M P)
LANSING—Carrier Stephens Company (C M P)
LANSING—Wheaton Chemical Company (C P)
SAGINAW—McKesson & Robbins, Inc. (C M P T)

MINNESOTA
MINNEAPOLIS—W. H. Barber Company (P T)
MINNEAPOLIS—McKesson & Robbins, Inc. (C M P T)
ST. PAUL—Lyons Chemicals, Inc. (C M P)

MISSISSIPPI
JACKSON—F. H. Ross & Company, Inc. (C M P)

MISSOURI
KANSAS CITY—McKesson & Robbins, Inc. (C M)
KANSAS CITY—Missouri Solvents and Chemicals Co. (C M P)
KANSAS CITY—Sherwood and Company, Inc. (C M P T)
ST. LOUIS—McKesson & Robbins, Inc. (C M P T)
ST. LOUIS—Independent Oil Company (C M P T)
ST. LOUIS—G. S. Robins and Company (C M P)
ST. LOUIS—Missouri Solvents and Chemicals Co. (C M P)

NEBRASKA
OMAHA—Barton Solvents Company (C M P T)
OMAHA—McKesson & Robbins, Inc. (C M P T)

NEW JERSEY
BLOOMFIELD—McKesson & Robbins, Inc. (C M P)
CAMDEN—Callahan Chemical Company (C M P T)
EAST PATERSON—Aetna Chemical Corp. (C M P T)
MURRAY HILL—American Mineral Spirits Co. (C M P T)
NEWARK—American Oil and Supply Co. (C P)
NEWARK—National Oil and Supply Company (C M P T)
PALISADES PARK—Philip A. Hunt Company (C)
PERTH AMBOY—Modern Solvents & Chemicals Corp. (M P T)
RIVERDALE—A. H. Mathieu Company (P)
SOUTH KEARNY—American Chemicals, Inc. (C M P T)
VINELAND—Lirio Chemical Company (C P T)

NEW MEXICO
ALBUQUERQUE—Braun Chemical Company (C M P T)
ALBUQUERQUE—Edmunds Chemical Company (C M P T)

NEW YORK
ALBANY—Krackler & Campbell, Inc. (M)
ATHENS—Spick Products Company (P T)
BINGHAMTON—Collier Chemicals, Inc. (P T)
BRONX—Elco Solvents Corporation (M P T)
BROOKLYN—Enequist Chemical Company (C P)
BUFFALO—Buffalo Solvents and Chemicals (C M P)
BUFFALO—Chemical Sales Corporation (C M P T)
BUFFALO—McKesson & Robbins, Inc. (C M P T)
GARDEN CITY—Hogan Industrial Supply Corp. (C M P T)
GLOVERSVILLE—Eastern Chemicals, Inc., S. H. Ireland Div. (C M)
KEARNY—American Chemicals, Inc. (C M P T)
LONG ISLAND CITY—Peerless Oil and Chemical Corp. (C M P T)
NEW YORK—American Chemicals, Inc. (C M P T)
NEW YORK—McKesson & Robbins, Inc. (C M P)
POUGHKEEPSIE—Duso Chemical Company (C)
RENSSELAER—Eastern Chemicals, Inc. (C M)
ROCHESTER—Chemical Sales Corporation (C M P T)
SYRACUSE—Eastern Chemicals, Inc. (C M)
UTICA—Monarch Laboratories (C M P)

NORTH CAROLINA
CHARLOTTE—F. H. Ross & Company, Inc. (C M)
CHARLOTTE—Moreland Chemical Company (C M P T)
CHARLOTTE—Southern States Chemical Co. (C M P T)
GREENSBORO—F. H. Ross & Company, Inc. (C M)

OHIO
AKRON—Farley Solvents Company (C M P T)
AKRON—C. P. Hall Company (C M P T)
CANTON—Bison Corporation (C M P)
CINCINNATI—Amsco Solvents and Chemicals Co. (C M P)
CINCINNATI—Chipman Supply Company (T)
CINCINNATI—Herbert Chemical Company (P T)
CINCINNATI—McKesson & Robbins, Inc. (C M P T)
CLEVELAND—Man-Gill Chemical Company (C P T)
CLEVELAND—McKesson & Robbins, Inc. (C M P T)
CLEVELAND—National Solvents Corporation (C P T)
CLEVELAND—Ohio Solvents and Chemicals, Inc. (C M P)
CLEVELAND—R. W. Renton Company (C P T)
COLUMBUS—McKesson & Robbins, Inc. (C M P T)
DAYTON—Industrial Chemical Products Co. (C P T)
DAYTON—Ottoson Solvents, Inc. (T)
LIMA—Thomson Chemical Company (C M P T)
TOLEDO—Inland Chemical Co. (C M P)
TOLEDO—Toledo Solvents and Chemicals (C M P)
TOLEDO—M. I. Wilcox Company (C P T)
YOUNGSTOWN—Rhiel Supply Company (C M P T)

OKLAHOMA
OKLAHOMA CITY—McKesson & Robbins, Inc. (C M P T)
TULSA—McKesson & Robbins, Inc. (C M P T)
TULSA—Chemical Products, Inc. (C M P T)

OREGON
PORTLAND—Van Waters & Rogers, Inc. (C M P)

PENNSYLVANIA
CONSHOHOCKEN—American Mineral Spirits Co. (C M P T)
EASTON—Lehigh Valley Chemical Company (C M P T)
ERIE—Monarch Laboratories (T)
LEESPORT—R. W. Eaken, Inc. (C M P T)
McKEES ROCKS—Apex Soap and Sanitary Corp. (C P T)
PHILADELPHIA—Alex C. Fergusson Company (C P T)
PHILADELPHIA—McKesson & Robbins, Inc. (C M P T)
PHILADELPHIA—Phillips and Jacobs, Inc. (C M)
PHILADELPHIA—Pioneer Salt Company (C M P T)
PHILADELPHIA—George Senn, Inc. (C M P T)
PITTSBURGH—Carmac Chemical Company, Inc. (C P)
PITTSBURGH—Carman-Pittsburgh Company, Inc. (C)
PITTSBURGH—Ft. Pitt Chemical Company (C)
PITTSBURGH—McKesson & Robbins, Inc. (C M P T)
READING—Textile Chemical Company (C P)
SCRANTON—Scranton Chemical Company (C P T)
YORK—Industrial Solvents and Chemicals Co. (C P T)

RHODE ISLAND
CRANSTON—Giffordline Chemical Company (C M P T)
PROVIDENCE—George Mann & Company, Inc. (C M P T)
PROVIDENCE—Sessions-Gifford Company, Inc. (C M P T)

SOUTH CAROLINA
CHARLESTON—Burris Chemical Company (C P T)
GREENVILLE—F. H. Ross & Company, Inc. (C M)
GREENVILLE—Southern States Chemical Co. (C M P T)
SPARTANBURG—Moreland Chemical Co., Inc. (C M P T)

TENNESSEE
CHATTANOOGA—Chapman Chemical Co. (C M P T)
CHATTANOOGA—Wilson Sales Company (C M P T)
KINGSPORT—Chem-I-Dent, Inc. (C P T)
MEMPHIS—Chapman Chemical Company (C M P T)
MEMPHIS—C. P. Hall Company (C M P T)
MEMPHIS—Ideal Chemical and Supply Co. (C M P T)
NASHVILLE—Chapman Chemical Company (C M P T)
NASHVILLE—Wilson Sales Company (C M P T)

TEXAS
AMARILLO—State Chemical Company (C M P T)
AUSTIN—R. M. Hughes Company, Inc. (C M P T)
BEAUMONT—Arthur Dooley and Son (C M P T)
CORPUS CHRISTI—McKesson & Robbins, Inc. (C M P T)
DALLAS—McKesson & Robbins, Inc. (C M P T)
DALLAS—Texas Solvents and Chemicals Co. (C)
DALLAS—Van Waters and Rogers, Inc. (C M P T)
EL PASO—Baron Chemical Company (C M P T)
EL PASO—Braun Chemical Company (C M P T)
EL PASO—Mine and Smelter Supply Company (P)
FORT WORTH—McKesson & Robbins, Inc. (C M P T)
HOUSTON—McKesson & Robbins, Inc. (C M P T)
HOUSTON—W. H. Curtin and Company (P)
HOUSTON—Dixie Chemical Company (C M P T)
HOUSTON—R. M. Hughes Company, Inc. (C M P T)
HOUSTON—Texas Solvents and Chemicals Co. (C M P)
HOUSTON—Van Waters and Rogers, Inc. (C M P T)
LUBBOCK—State Chemical Company (C M P T)
MIDLAND—State Chemical Company (C M P T)
ODESSA—McKesson & Robbins, Inc. (C M P T)
SAN ANTONIO—R. M. Hughes Company, Inc. (C M P T)
SAN ANTONIO—McKesson & Robbins, Inc. (C M P T)
TERMINAL—State Chemical Company (C M P T)

UTAH
SALT LAKE CITY—Braun-Knecht-Heimann Co. (C M P T)

VIRGINIA
RICHMOND—Phipps and Bird, Inc. (C M P T)
ROANOKE—Havnaer Supply Company (C M P T)

WASHINGTON
SEATTLE—Van Waters & Rogers, Inc. (C M P)
SPOKANE—Van Waters & Rogers, Inc. (C M P)

WEST VIRGINIA
BLUEFIELD—Fairmont Supply Co. (T)
CHARLESTON—B. Preiser Company, Inc. (C M P T)
FAIRMONT—Fairmont Supply Company (C P T)
HUNTINGTON—Cabell Chemical Company (C P T)

WISCONSIN
APPLETON—McKesson & Robbins, Inc. (C M P T)
CHIPPEWA FALLS—Lyon Chemicals Co., Inc. (C M P)
LA CROSSE—North Central Chemicals, Inc. (C M P T)
LA CROSSE—Wisconsin Solvents & Chemicals Corp. (C M P)
MADISON—North Central Chemicals, Inc. (C M P T)
MILWAUKEE—Benlo Industrial Chemicals Company (P T)
MILWAUKEE—McKesson & Robbins, Inc. (C M P T)
MILWAUKEE—Wisconsin Solvents & Chemicals Corp. (C M P)
WAUKESHA—F. P. Jay Chemicals, Inc. (C M T)

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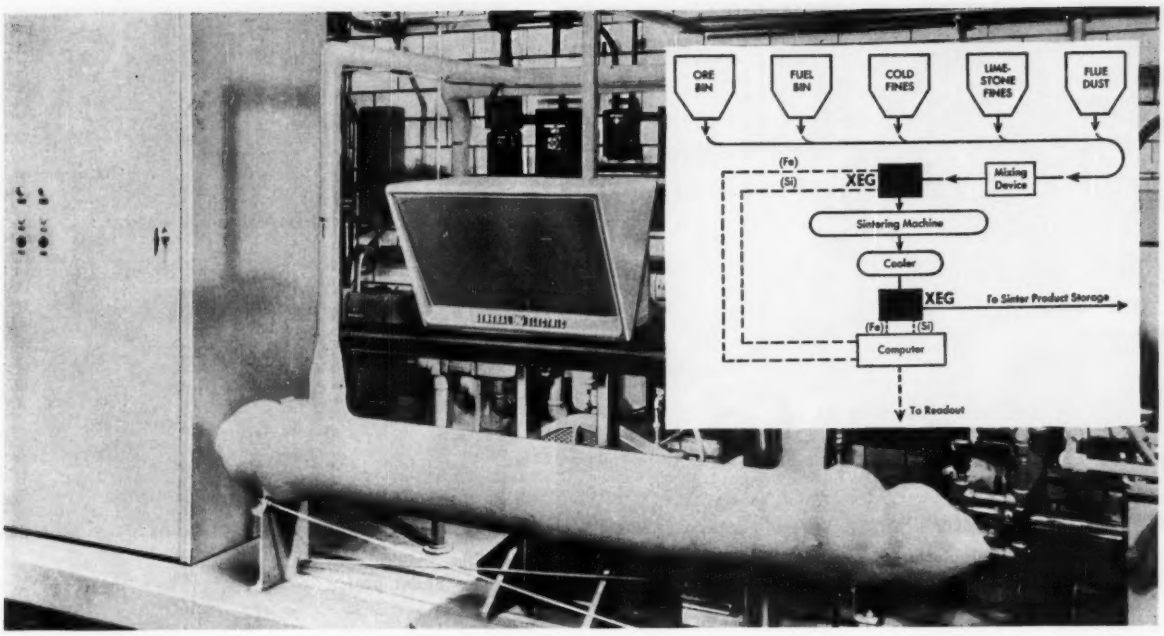


Control cabinet houses power and measuring components in a typical x-ray gage installation. Measuring head (center) contains x-ray tube and other analysis equipment.

Pipe under the head carries material being analyzed. Inset: X-ray emission gages (XEG) in a sintering setup monitor the mix and the finished product

Multielement Analysis Expedited by X-Ray Gage

Instrument tells presence and percentage of elements in solids, liquids, slurries, wet or dry powders, and sheets. It can check for six substances simultaneously

CONTINUOUS analysis of materials containing several elements promises to move industrial chemistry from the laboratory to the production line. An x-ray emission gage (XEG) developed at the X-Ray Dept., General Electric Co., Milwaukee, is said to make such analysis possible.

The instrument simultaneously checks the presence and amounts of five elements with a reference (or six without a reference), from aluminum upward in the periodic table.

• The system is flexible, analyzing materials in many forms and providing a readout adaptable to several uses.

XEG is said to give graphic, on-line analysis of materials in liquid, slurry, or solid form. Results are equally good on sheets, and on dry or moist powders. The equipment can also analyze individual samples of the same material.

Output from the gage is adaptable to computing, control, and indication. It can be calibrated to indicate any desired measurement, such as percentage, pounds per ton, or tons per hour. Some measurements require accessory equipment.

The measuring head—one of two major gage components—houses an x-ray tube, and includes collimation slits, analyzing crystals, counter tubes, and preamplifiers for analysis of desired elements. The head also provides a suitable reference radiation.

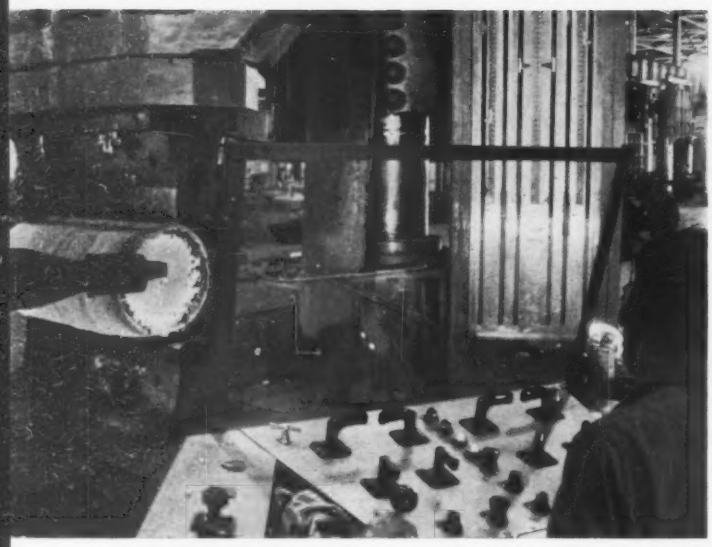
The other major item, a control cabinet, houses all power and measuring components. Essential operating switches are mounted on the outside of the cabinet; when the gage is set for a particular analysis, the cabinet door can be closed and locked.

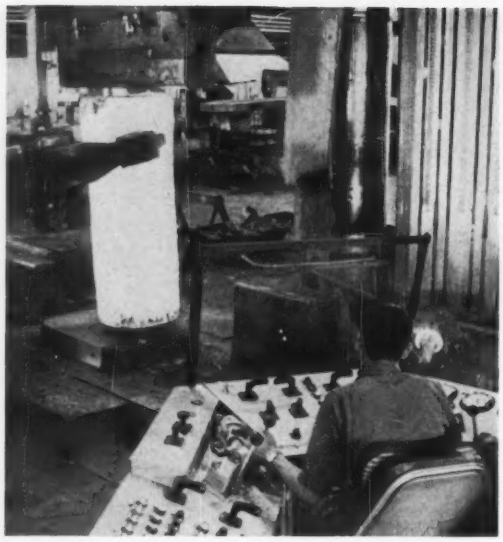
• The gage is said to be suitable for innumerable applications.

X-ray emission spectrometry has been known for half a century, but lack of the right instrumentation delayed its industrial use. But in the last 15 years, the speed, accuracy, flexibility, and nondestructive features of the method have made it suitable for many applications.

Potential use areas: Mining, cement, petroleum, steel, chemical, and pharmaceutical industries.

The equipment can control on-line processes from the waste end. Example: Measurement of copper tailings. It can also be used to control inflow of materials to a sinter line or other similar process. It is useful for controlling the degree and quality of blended or mixed products. And it permits process efficiency to be checked through analysis of end products.





The press and manipulator are controlled from the pulpit. Where possible, they're arranged so a movement of the controls produces a similar motion of piece under press

Press Design Makes Forge Shop Versatile

Specialty steel producer designed the two column, inverted forging press. It meets job shop production problems, handles large and small ingots in a variety of materials

INGOTS of low and high alloy steels, high temperature alloy steels, stainless, titanium, and other metals weighing up to 15 tons and measuring 40 in. square can be worked on a two column forging press designed by Allegheny Ludlum Steel Corp., Pittsburgh. It can also work billets 6 in. square.

The unit can handle many analyses with predictable quality and yield. It also meets job shop production problems.

Factors that were important in the design include hammer pressure control, forging speed, pumping design, forging dies, and material handling equipment.

Before the project was started, U. S. and European practices were surveyed by Emil Kern, vice president, engineering, and Walter Breeler, works manager (Dunkirk, N. Y.).

• With close control over hammer pressure, quality has improved.

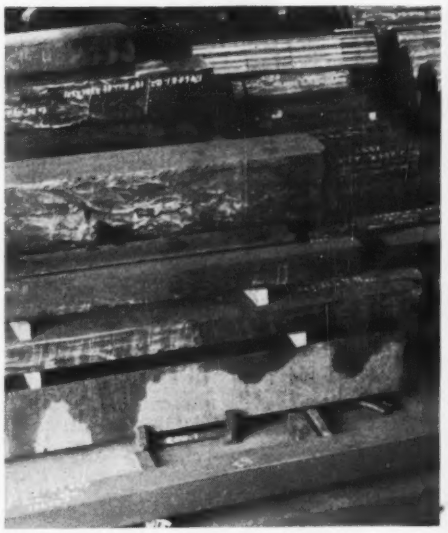
The Dunkirk press can be controlled within a wide range of unit pressures. With a standard die set in the press, reductions in unit pressure are obtained by pump control. If higher unit pressures are desired, a die change is made.

The arrangement enables metallurgists to specify the force and die size to be used for any analysis of steel and any combination of press conditions. Forging cracks, tears, and internal bursts and ruptures are minimized. Such internal defects can shorten tool life and cause production delays.

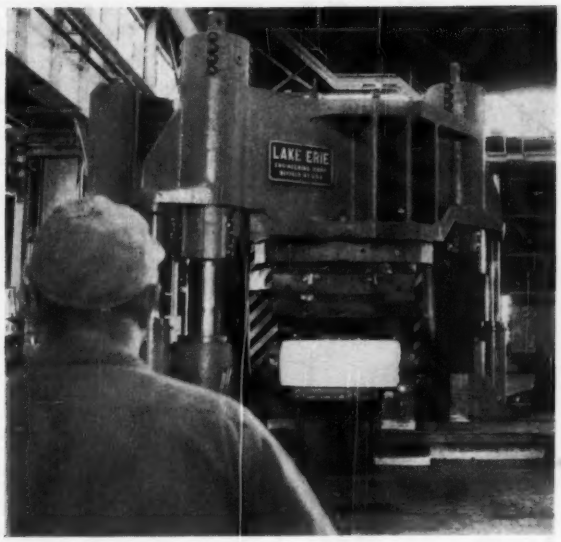
• Rapid forging permits a maximum amount of hot working before the ingot or billet has cooled below its minimum temperature.

The factor is particularly critical with sulfur bearing steels because they have narrow forging ranges. At the same time, care must be used to prevent the material from being deformed at such a high speed that localized tearing would result.

• With direct pumping design, the



Such materials as low alloy tool steels, high alloy steels, high temperature



The gripper arms handle workpieces from 3 to 60 in. The press (made by Lake Erie Machinery Corp., Buffalo) is a pull-down type with no hydraulic piping above the floor

maximum capacity of the press is immediately and continuously available.

As each forging stroke is started, the pressure rapidly builds up to the desired level and is held there as long as necessary. The constant pressure results in uniformity of forged structure from piece to piece.

• The die slide design makes it possible to change the bottom die in 15 seconds.

alloy steels, stainless steels, and titanium are handled by the press

The press is equipped with a lateral die shifting mechanism that has five sliding bolsters 7 ft long and 4 ft wide. A combination forging die and cutoff knife permits fast, efficient cutting of forgings under the press. Many other tools, such as V-dies, straightening dies, jackstands, and upsetting bolsters, can also be mounted on the bolsters. Using the slide, the top die can be changed in less than 5 minutes.

• Upper and lower limits of the press cycle are controlled by limit or adjustable pressure switches.

The press is reversed by the limit switch setting or selected tonnage, whichever is reached first, permitting forging or planishing to size or to any tonnage within the capacity of the press.

Two sets of control limit switches, each individual switch being remotely adjusted from the pulpit, are provided for forging pieces with unequal sides, such as flats, or for opening the dies to permit the rotating of squares. Experience shows that size can be held within less than $\frac{1}{8}$ in. by this method. To compensate for different height forging dies, the limit switch scale can be zeroed.

• Material handling equipment has to be versatile.

Handling must be quick and easy to prevent temperature losses between the furnace and die. The charging machine has an automatic door opening apparatus that enables the operator to select and operate any furnace door from any position in the press aisle. It's also used to control a hydraulic lift and motorized ingot turnaround in front of the press.

A 6 ton manipulator is used at the press. It's remotely controlled from the floor mounted pulpit adjacent to the press which also contains the press controls. The jaws permit forging sections down to 4 in. square from end to end under the press die without turning the piece. An overhead 15 ton crane can be used to assist the manipulator in handling ingots. A 50 ton crane installed on a second level above the main crane runway can also be used.

• Tailoring of the relatively narrow top crosshead of the press permits a close approach to the die with handling equipment.

It's clear of prefill tanks, valves, or piping. Damage to such auxiliary equipment by cranes is eliminated. Chains or other aids can be hung from the crosshead to assist in supporting pieces during the forging operation.

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Giant Radiotelescope of Aluminum to Probe Space

The largest aluminum dish yet built will soon be probing the sky to provide answers for the future space traveler.

Six hundred feet in diameter (the 250 ft telescope at Jodrell Bank, England, is now the largest), the structure, equal in height to a 60 story building, will be erected at Sugar Grove, W. Va. It will be operated by the Navy.

Reynolds Metals Co., Richmond, Va., will provide more than 2 million lb of aluminum shapes to the Columbus, Ohio, Div. of North American Aviation Inc., builder of the unit.

Alloys 5456 and 6062 have been chosen for all extruded tubing; 5456 for all sheets and plates. Drawn tubing will be of 5052 and extruded shapes 6061, 6062, or 5456. All have high magnesium content.

Three Ply Rubber Lining Guards Pickle Line Parts

Rubber lining will protect areas exposed to acid in a pickling line being built for Tennessee Coal & Iron Div., United States Steel Corp., Fairfield, Ala. The 391 ft unit is under construction in the tank lining department, Goodyear Tire & Rubber Co., Akron.

Under a contract from United Engineering & Foundry Co., Pittsburgh, Goodyear engineers designed the pickling section for a maximum speed of 1000 ft a minute, says R. C. Ten Eyck, manager of tank lining sales.

Steel tanks, covers, ductwork, walkways, fume scrubbers, blowers, exhaust stack, and side guides are being lined with a three ply course of acid resistant rubber, called Trioweld. Each section is vulcanized in an autoclave to bond the lining permanently to the steel and insure maximum chemical resistance.

When the tanks are welded together and sealed in the field, 12 in. of acid brick sheathing will be applied to the sides and bottom to give added protection against physical abuse and hot acid solutions.

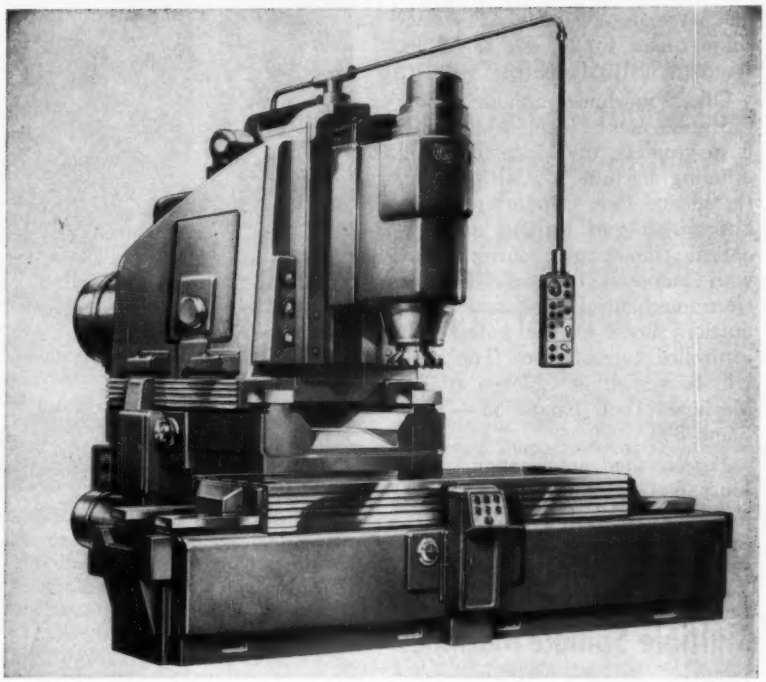
Milling Machine Has 50 hp at Each Spindle Speed

HERE is a milling machine (3006 Mil-waukee-Mil) with the capacity of a large bed type and the versatility of a knee type. A 50 hp motor powers the spindle through 24 speeds from 15 to 1500 rpm. Spindle speeds are selected and changed through an electrohydraulic system.

The vertical spindle head has its own 2 hp feed drive motor. An infinite number of feed rate changes from 1/8 to 75 ipm and a rapid traverse rate of 100 ipm power the head through its vertical range.

Other developments include the 307-S12, plain style, knee type, milling unit with automatic cycle and the 307-S12, vertical style, knee type, milling machine with standard table cycle control. The units will be shown in Chicago at The Machine Tool Exposition — 1960, Booth 1008.

For further information, *write* Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wis.

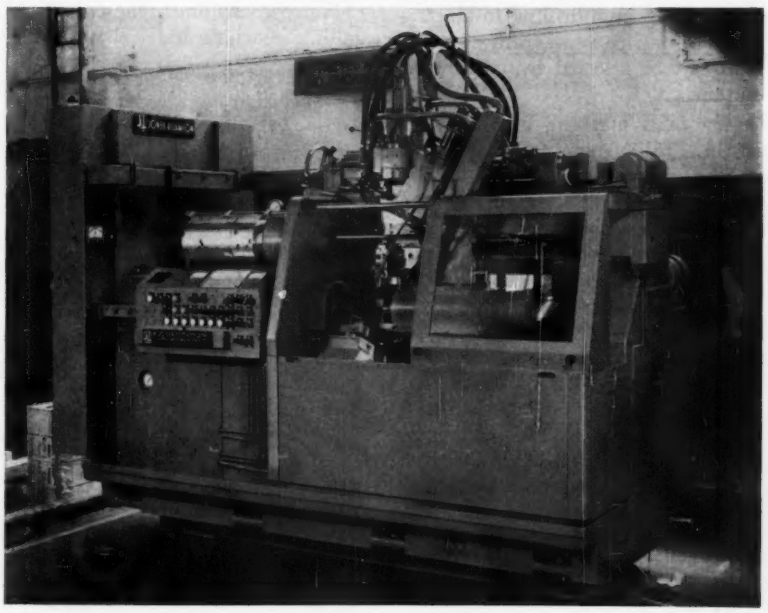


Rigidity Designed into Single Spindle Lathes

THE Model 30, single spindle, automatic, turning and tracing lathe has a wide range of spindle speeds (up to 32), with automatic speed and feed change during a cut.

Bridge bed design provides maximum rigidity. Tool motion provides versatility. The unit is easy to load and unload (manually or automatically).

A variety of components can be added to the base machine to meet requirements. Multiple tooling can be applied to a rear forming slide, or a rear facing, forming, and turning slide (mounted on the lower bed). The upper bed can carry a multiple tooled turning slide, a 60 degree tracing slide, or a 180 degree (two dimensional) tracing slide. The two dimensional slide is hydraulically controlled and can be multiple tooled for tracing operations for any

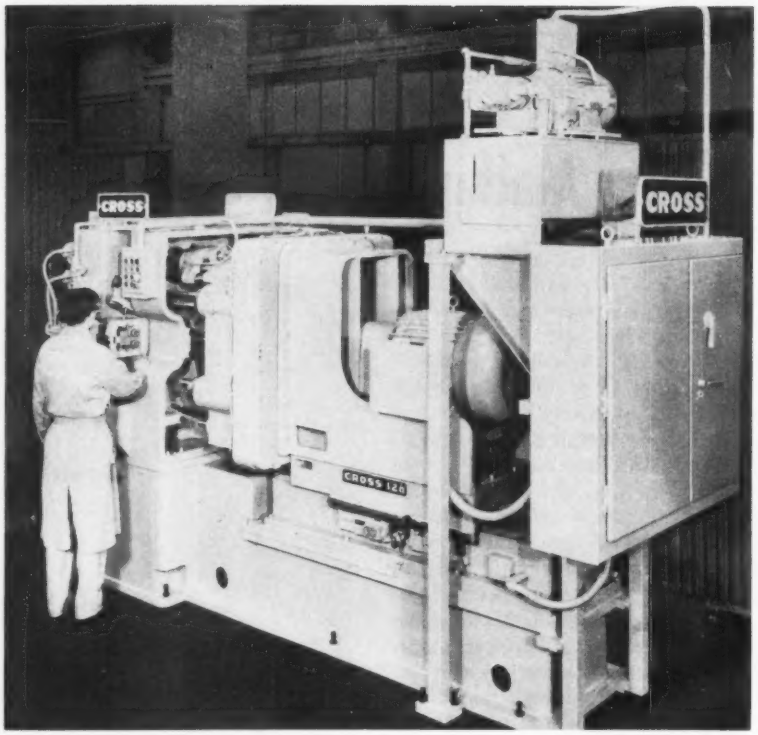


one of eight different tool travel cycles (all control tool motions go through 180 degrees of travel).

Two different headstock transmissions (16 or 32 speed) and two different spindle noses (6 in. A-1 or 8 in. A-1) are available. The machine comes in 24, 48, or 72 in. standard bed lengths.

Other machines announced by the same maker include automatic form grinders, the Model F thread grinding machine, a small precision thread and form grinding machine, a precision gun drilling machine, optical comparators, turret lathes with automatic transmissions, an electromechanical lathe, and a production model of the numerically controlled turret lathe. The units will be shown in Chicago at The Machine Tool Exposition — 1960, Booth 839.

For further information, *write* Jones & Lamson Machine Co., 40 Woolson St., Springfield, Vt.



TOOLS ARE FED AT THREE DIFFERENT RATES ON THIS TRUNNION MACHINE. With accelerated spindles used to obtain different feed rates, individual operations can be set up for best surface finish, minimum tool costs, and maximum tool life. The unit shown here processes combination clutch and brake master cylinders which require drilling, spot facing, hollow milling, and reaming. All tools are mounted on a single head. For further information, **write** Cross Co., Park Grove Station, Detroit 5, Mich.

You Can Drill or Tap on Multiple Spindle Machines

THE FB LINE of multiple spindle machines offered by Natco consists of large, vertical units with provisions for drilling and tapping in the same head.

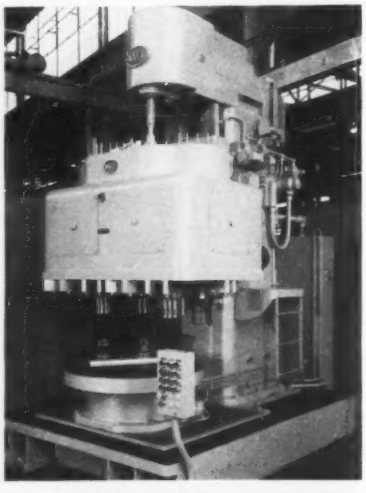
Electric clutches in the neck permit shifting from drilling to tapping spindles or vice versa. Either operation can be selected by touching a button.

The F2B machine has a 19 by 24 in. drilling-tapping area, a 7½ in. hp spindle drive, and delivers 8100 lb of thrust. The F4B machine has a 30 by 54 in. drilling area and delivers 30 hp and 25,000 lb of thrust at the spindle. Other sizes are available with many options.

• **Other Equipment**—A mechanical honing machine can do production honing operations on bores up to 3 in. in diameter and 3 in. in length. Rotational speeds of 200 to 800 rpm and reciprocation from 60 to 240 strokes a minute are fixed by pick-off gears.

The hydraulic honing machine is similar to the mechanical unit. It has a 24 in. stroke and will hone bores up to 7½ in. in diameter and 9 in. long.

Natco's drilling, tapping, and milling machine has full numerical depth control and numerically controlled positioning.



The Model FB multiple spindle drilling tapping units use a single speed motor

Metalworkers who use the tracer and copy lathes will find the automatic centering machine suitable for workpieces up to 3 in. in diameter and 3 ft long (longer with an extension work rest). It reduces the cost of centering operations and provides more accurate centers on multiple part, turning jobs. It mills workpiece ends, deburrs them, and drills centers within 0.002 in. of specified depth. A 200 ton, hydraulic press brake is the company's venture into the metal forming field. Characteristics include equalization of off-center forces in the ram by both hydraulic blocking valves and a mechanical torsion bar. Several tonnages and sizes will be available. The H-6 multiple spindle, drilling-tapping units have been redesigned with electric clutches in the neck to permit instantaneous shifting from drilling to tapping on the same

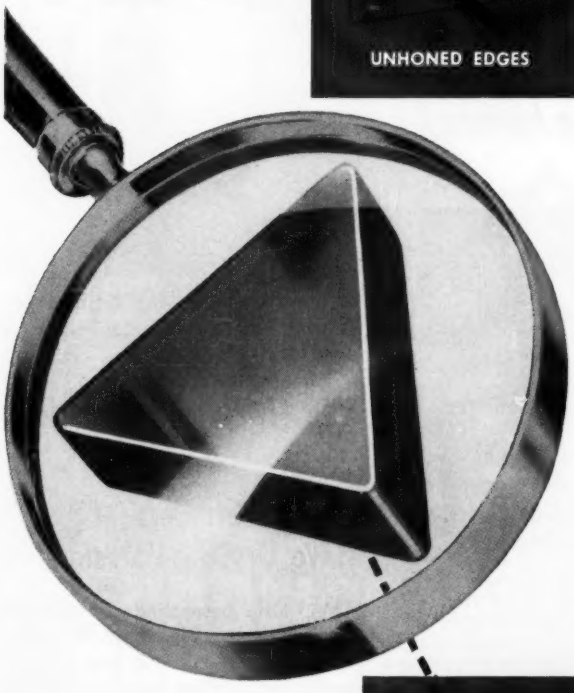
Metallurgical Memo from General Electric

General Electric announces pre-honed CARBOLOY® inserts

Hand-honing is inaccurate, and time-consuming—frequently results in premature chipping and breaking.

Chamfered, or ground-flat, edges are geometrically weaker than a radius and are more easily chipped or broken.

Unhoned or as-ground inserts show rough edges—result in unpredictable tool life due to chipping.



Shown here, both under magnification and graphically, is an edge of the new Carboloy pre-honed insert. Radius is geometrically ideal to minimize chipping, extend tool life many times.

Now you get more predictable tool life... lower cost per cutting edge ...no hand-honing cost!

Ready-to-use... honed to a precise radius... promise BETTER PROFITS THROUGH BETTER TOOLING

Now General Electric Carboloy inserts are pre-honed *at the factory!* Here's what it means to you:

1. An insert with edges honed to precise *radii* gives the strongest geometric shape to withstand cutting pressures. This reduces chipping – increases the predictability of tool life. Hand honing *cannot* achieve precise radii – G-E pre-honing can . . . and does!
2. Since chipping is minimized, fewer cutting edges are wasted. The result is lower cost per cutting edge.
3. Since inserts come pre-honed and ready-to-use, the labor cost of hand honing is eliminated. This more than offsets the charge for pre-honing.
4. Pre-honed Carboloy cemented carbide inserts have standard edge radii honed to a greater or lesser degree, depending on the job to be done. You'll *know* the honing is right!

Ask your Authorized Carboloy Distributor about pre-honed Carboloy inserts, convertible seats, toolholders, and brazed tools. Or, write: *Metallurgical Products Department of General Electric Company,* 11141 *E.* 8 *Mile Street, Detroit* 32, *Mich.*

TOPS IN TOOLING QUALITY

From the research and quality-control facilities of the Metallurgical Products Department of General Electric comes the outstanding quality tooling line in the metalworking industry. The new Carboloy pre-honed inserts, as well as the complete line of Carboloy toolholders, inserts, insert seats, convertible seats, and brazed tooling, are designed to meet every tooling need efficiently and economically.

CARBOLOY®
CEMENTED CARBIDES

METALLURGICAL PRODUCTS DEPARTMENT

GENERAL ELECTRIC

CARBOLOY® CEMENTED CARBIDES
MAN-MADE DIAMONDS • MAGNETIC MATERIALS
THERMISTORS • THYRITE® • VACUUM-MELTED ALLOYS

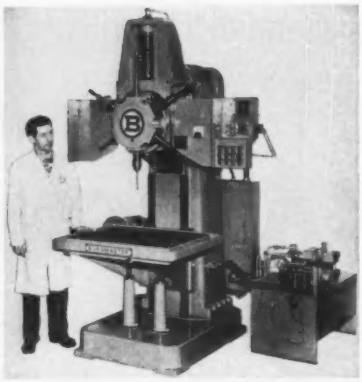
machine (manual shift is also available).

Other new equipment includes FA, FF, FG, and FA machining units. The FA units are for vertical operation and have a column, slide, head, and self-contained hydraulic power supply. The FF "Holeunits" are for operation at any angle. They are mounted on thin, flat bases, and have a self-contained hydraulic power supply. The equipment will be shown in Chicago at The Machine Tool Exposition—1960.

For further information, *write* National Automatic Tool Co. Inc., Richmond, Ind.

Drilling Unit's Capacity In Steel Is 1¼ in.

A HEAVY duty, six spindle, turret drilling machine (Model 25 AH) can do precision drilling, reaming, tapping, boring, counterboring, spotfacing, port cutting, and other similar work without guide bushings.



The unit (driven with 7½ hp) has a 1¼ in. capacity in steel and a speed range of 90-3000 rpm. Throat depth is 17 3/16 in. and turret travel is 10 in.

The design features include constant positive hydraulic feed with dial set; direct reading electrical feed indicator; and automatic temperature and pressure compensation of hydraulic feed to help insure accurate feed rates.

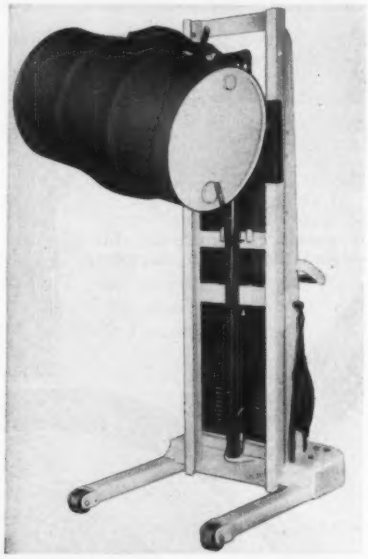
Other developments in the Burgmaster line include two numerically controlled turret drills. The units will be shown in Chicago at The Machine Tool Exposition — 1960 (Booth 834).

For further information, *write* Burg Tool Mfg. Co. Inc., 15001 S. Figueroa St., Gardena, Calif.

Lift Truck Rotates Drums Weighing Up to 1000 lb

LOW and high level pouring up to 130 in. can be done by a 360 degree drum rotating lift truck. The unit shown can handle drums up to 1000 lb.

It's designed for fast operation in narrow, crowded aisles. Tilting and pouring are controlled from ground level. The drum tilting mechanism



is interchangeable with lifting forks. A wide choice of lifting heights is available.

For further information, *write* Big Joe Mfg. Co., Wisconsin Dells, Wis.

Surface Grinders Have Dry Base Design

TWO DRY base grinders have been developed by Blanchard Machine Co. Model 18-A2 is a two spindle, automatic, surface type with 30 hp, foot type, spindle motors. All controls are interlocked for safety. A warning light flashes when grinding wheels require replacement.

The unit has a plain table for mounting special workholding fix-

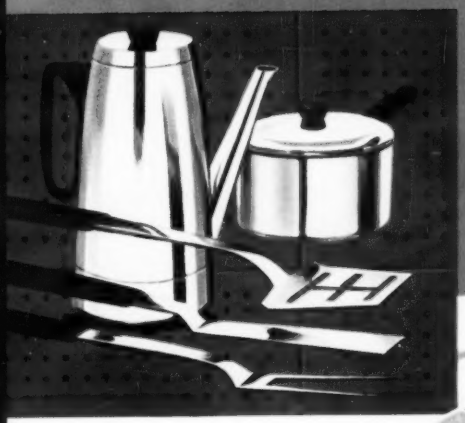
800 to 1 hp favorites for quiet operation, low maintenance and long-life service . . .

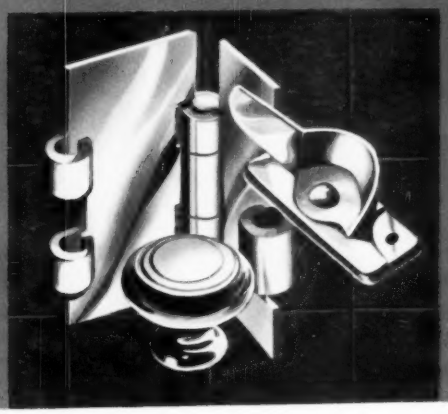
From the case of the A. O. Smith Motor Man — a complete stable of integrals that include single-phase models (1-5 hp) or polyphase (1-800 hp). Also a team of fractional-hp motors. All are sure bets to give top performance over the long, long haul.

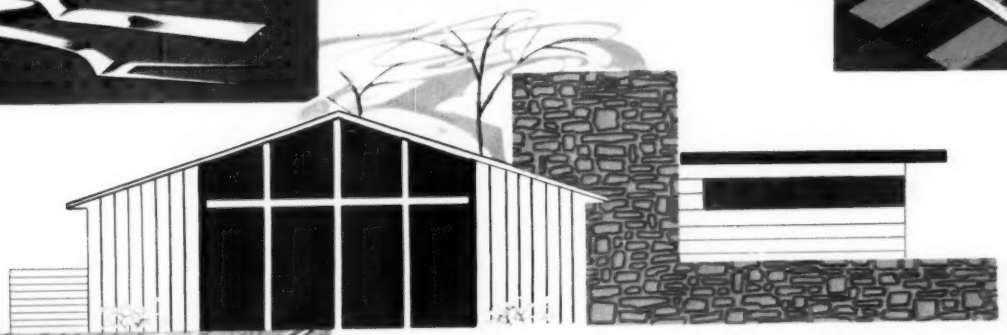
And there's an A. O. Smith Motor Man near you — chomping at the bit to give you 24-hour action on all parts and service orders.

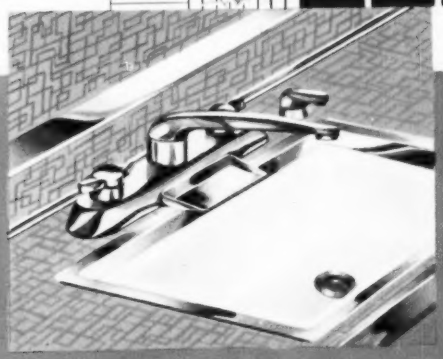
Fine to have around the house

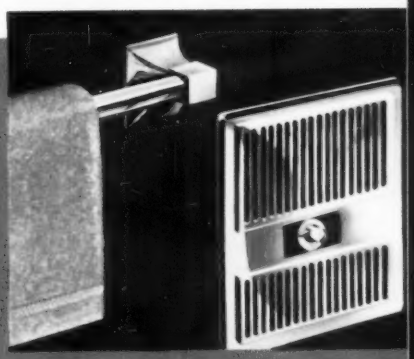
for every stainless reason!











Superior

STAINLESS STRIP STEEL

At every turn, stainless serves in the modern home . . . brightens the decor, lightens every cleaning chore! From Superior Stainless Strip Steel, precise in specification for each specified need, are made scores of tarnish-proof, wear-resisting, care-banishing home products. ● Let us discuss our steels and your fabrication possibilities, without obligation of any kind.

Superior Steel Division

OF

COPPERWELD STEEL COMPANY

CARNEGIE, PENNSYLVANIA

For Export: Copperweld Steel International Company, New York

Would you spend an extra 10%

to double roller chain life?

Morse H-E Roller Chain overcomes metal fatigue . . .

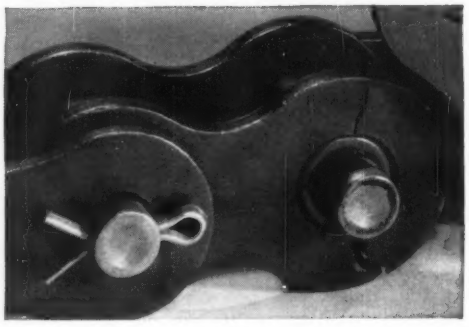
lasts from 2 to 5 times longer . . .

costs only 10 per cent more than ordinary roller chain!

Yes, now by paying just a slight premium you can buy Morse H-E (high endurance) roller chain . . . and get 2 to 5 times the service life over ordinary chain. Here's why:

Normal roller chain breaks sooner under the rigors of "stop-and-start" or heavy strain operations. It's this "tired metal" problem that plagues anyone who has used roller chain. Morse has developed a process to overcome metal fatigue. As a result, Morse H-E Roller Chain has a 95% greater endurance limit . . . lasts up to 500% longer . . . costs just 10% more.

Make a test yourself. Next time you need roller chain, try Morse H-E and compare. Your Morse Chain distributor is the man to see. He's listed in the Yellow Pages under "Power Transmission." Or write: Morse Chain Company, Dept. 2-80, Ithaca, N.Y. Export Sales: Borg-Warner International, Chicago 3, Ill. In Canada: Morse Chain of Canada, Ltd., Simcoe, Ont.

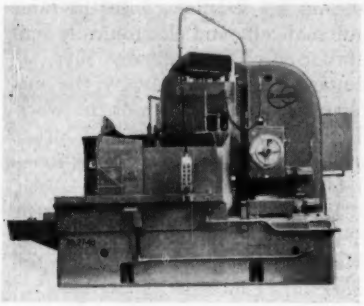


ORDINARY CHAIN BREAKS when the side plate tires from repetitive loading and unloading during the cycle around the sprockets. But Morse H-E Roller Chain has a 95% higher endurance limit . . . outlasts ordinary chain by up to 5 to 1 under repeated loading.

MORSE B-W T.M.

A BORG-WARNER INDUSTRY

ONLY MORSE OFFERS ALL FOUR: Roller Chain, Silent Chain, Hy-Vo® and "Timing"® Belts



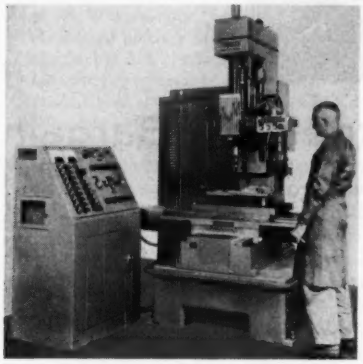
tures and a six speed gearbox for table rotation with a provision for locking it in a preselected speed.

Model 27-48 has a 48 in. diameter magnetic chuck with a clearance of 52 in. inside the waterguards, 12 in. vertical range, and a 27 in. segment grinding wheel. It comes with a 75 hp main spindle motor. The units will be shown in Chicago at The Machine Tool Exposition—1960 (Booth 1209).

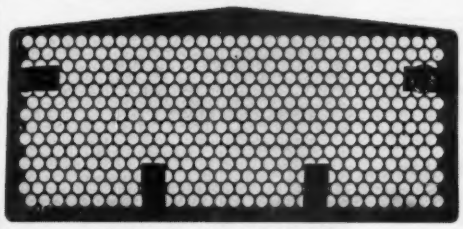
For further information, *write* Blanchard Machine Co., Cambridge, Mass.

Layout Drilling Machine Has Tape and Dial Input

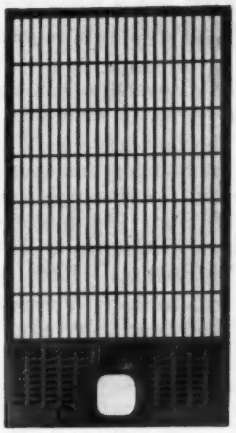
A LAYOUT drilling machine (Edlund-Matic) with numerical control tape and dial input has provision for nine tool changes. It's flexible in setting up a wide variety of operations. Each speed and feed is set up from the operator's control station.



Initial setups of speeds and feeds are made through knobs and the speed and feed are constantly indicated on precision direct reading



Rodent Guard for Electric Motor



Grille for Electric Heater

THEY SAVE MONEY
by letting
***"DIAMOND"* DO IT**

For nearly half a century we have been furnishing perforated metal sheets, plates and parts to manufacturers of industrial equipment and household appliances, at lower cost than if the work were done in their own shops. No magic — just because we are especially equipped and organized for that type of work.

Let us quote on YOUR requirements. When given sufficient information, our experienced engineers are often able to make money-saving suggestions and always welcome an opportunity to do so.

Our new 32-page catalog illustrates a great variety of perforated metal patterns and gives complete working data. Also shows many modern applications. Write for Catalog 59. No charge or obligation.

DIAMOND MANUFACTURING CO., WYOMING (Wilkes-Barre Area) PENNA.

Manufacturers of DIAMOND Perforated Metal Panels for Modern Acoustical Ceilings.

New concept in power feeds

Rockwell announces a new line of Delta 20" Power Feed Drill Presses with a totally different concept: fitting the mechanical control movements of the machine to the natural, easy motion of the operator's hand. This makes possible a simple, low cost method of increasing productivity and improving drilling quality.

Such an advanced development in mechanical power feeds offers advantages *never before available* on a standard drill press—up front control for effortless one hand operation; infinitely adjustable drill point pressure; and a built-in feature for remote control or interlocking with automation devices. Write for free brochure on floor, bench, overhead and multiple-spindle models. Rockwell Manufacturing Company, Delta Power Tool Division, 638H N. Lexington Ave., Pittsburgh 8, Pa.

dials. Capacity is 1 in. in cast iron and 7/8 in. in mild steel.

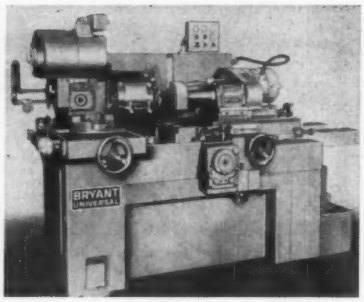
The unit has spindle travel of 7 in. and sliding arm travel of 10 in. Spindle speed ranges from 225 to 2700 rpm. The machine will be shown in Chicago at The Machine Tool Exposition—1960 (Booth 531).

For further information, *write* Edlund Machinery Co., a division of Harsco Corp., 4470 Huntington St,. Cortland, N. Y.

Internal Grinder Becomes General Purpose Machine

ID, OD, internal face, and rotary face grinding can be done with a Bryant unit. Swing inside the standard chuck guard is 12 in. with a maximum grinding stroke of 16 in.

The compound wheel slide construction places the traverse slide above the cross slide. That cuts the reciprocating mass to a minimum, and allows the use of feed controls



which do not reciprocate with the traverse motion of the wheel slide. The unit will be shown in Chicago at The Machine Tool Exposition—1960 (Booth 936).

For further information, *write* Bryant Chucking Grinder Co., Springfield, Vt.

Duplicating Attachment Announced for Shaper Line

AN ELECTRONIC duplicating attachment for Smith & Mills shapers does not interfere with normal operation or capacity. The attachment, a Voss electronic duplicator, controls vertical table travel while the table is feeding horizontally.

The stylus follows the contour of the master template, with the table automatically and electronically synchronized. The company says accuracy is limited only by the mechanical characteristics of the work. The unit will be shown in Chicago at The Machine Tool Exposition—1960 (Booth 1319).

For further information, *write* Smith & Mills Shaper Div., Nebel Machine Tool Corp., 3497-A Central Parkway, Cincinnati 25, Ohio.

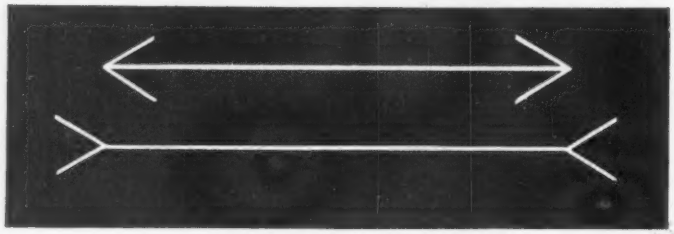
Machine Bearings Are Lubricated Automatically

CLEAN, filtered lubricant can be continuously circulated through machine bearings (at controlled rates) by an automatic lubricating system called Circulube. A pressure signal switch prevents machine operation until proper oil pressure has been developed.

For further information, write Bijur Lubricating Corp., Rochelle Park, N. J.

EXECUTIVE REPORT #24

APPEARANCES CAN BE DECEIVING



"Low-Price" Abrasives Can Be An Expensive Bargain

Measure the bars. The top one appears smaller, but it's not. Measure your present abrasive cost, and compare it with the proven low cost of Wheelabrator Steel Shot.

Don't be deceived by a low initial price. It's abrasive performance that gives true blasting economy . . . the lower abrasive consumption, faster cleaning, and lower maintenance enjoyed by users of Wheelabrator Steel Shot. Try it, and take a true measure of blast cleaning economy.

SEE THE PROOF IN YOUR OWN PLANT

Your Wheelabrator abrasive engineer will demonstrate the superior performance of Wheelabrator Steel Shot in your own plant. For data to help you control all your blast cleaning costs, write for Bulletin 905-D. Wheelabrator Corp., 509 S. Byrkit St., Mishawaka, Ind. In Canada, P.O. Box 490, Scarborough, Ont.

WHEELABRATOR
STEEL ABRASIVES

NEW Literature

Write directly to the company for a copy

Handbook of Crushing

The new edition of "Handbook of Crushing," 40 pages, covers mechanical size reduction. It describes impact, attrition, shear and pressure, and other reduction methods. Diagrams and charts are included. Pennsylvania Crusher Div., Bath Iron Works Corp., West Chester, Pa.

Welding Training

Fifty welding training aids are listed and described in a folder. The listing includes books on welding subjects, charts, educational films, training aids, codes, and specifications. Hobart Welding School, Troy, Ohio.

X-Ray Bibliography

A 20 page list of references presents authors and publications, titles, and publication dates for 376 papers on x-ray analysis, 1930 to 1960. Philips Electronic Instruments Div., Philips Electronics & Pharmaceutical Industries Corp., 750 S. Fulton Ave., Mt. Vernon, N. Y.

Beta Titanium Alloy

Metallurgy, design, welding, and forming characteristics of beta titanium alloy Ti-13V-11Cr-3Al are discussed in a 32 page manual. It includes 30 figures and 16 tables. Titanium Metals Corp. of America, 233 Broadway, New York 7, N. Y.

NEW BOOKS

Bulletin 585, Mineral Facts and Problems, Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. 1000 pages, $6

This is an encyclopedia reference on metals, nonmetals, mineral fuels, and the industries that produce them. Each of the 87 chapters can be purchased individually. New developments in electronics, atomic energy, zirconium, missiles, and space exploration are covered.

Literature Review of Infrared Energy Produced With Gas Burners, D. W. DeWerth, American Gas Association, 420 Lexington Ave., New York 17, N. Y., 49 pages, $2

Available literature on infrared energy is extensively evaluated. Gas fired burners are described and their performance is compared with that of other infrared generating sources. A list of possible future applications is included.

1960 *Canadian Trade Index,* Canadian Manufacturers' Association, 67 Yonge St., Toronto, Ont., 1150 pages, $12.50

Companies are listed alphabetically. Information includes main addresses, principal products, branch offices, brands, trademarks, export representation, and related material. A products list facilitates identification of manufacturers. An export section covers government and private services available to Canadian exporters.

Recommended Practices for Gas Shielded Arc Welding of Aluminum and Aluminum Alloy Pipe, Dept. T, American Welding Society, 33 W. 39th St., New York 18, N. Y., 40 pages, $2

All phases of aluminum pipe welding, from processes and machine settings, to welding techniques and heat treatment are covered. A conversion table presents the ASTM alloy designation and the corresponding commercial alloy number adopted by the Aluminum Association. Filler metals are discussed. Additional tables indicate the actual settings (current, gas flow, number of passes) required for various pipe sizes and thicknesses.

Controlled Rectifier Manual, Dept. SCR, General Electric Co., Charles Bldg., Liverpool, N. Y., 255 pages, $1

Application of silicon controlled rectifiers in electronic and electrical equipment is discussed. The manual gives the circuit designer detailed information about intermittent loads, firing, turnoff, heatsink design, paralleling and other application problems. There are chapters on protecting the units against overloads and faults, typical circuits operating from ac power, basic theory of operation, ratings, and characteristics.

EXECUTIVE REPORT #30

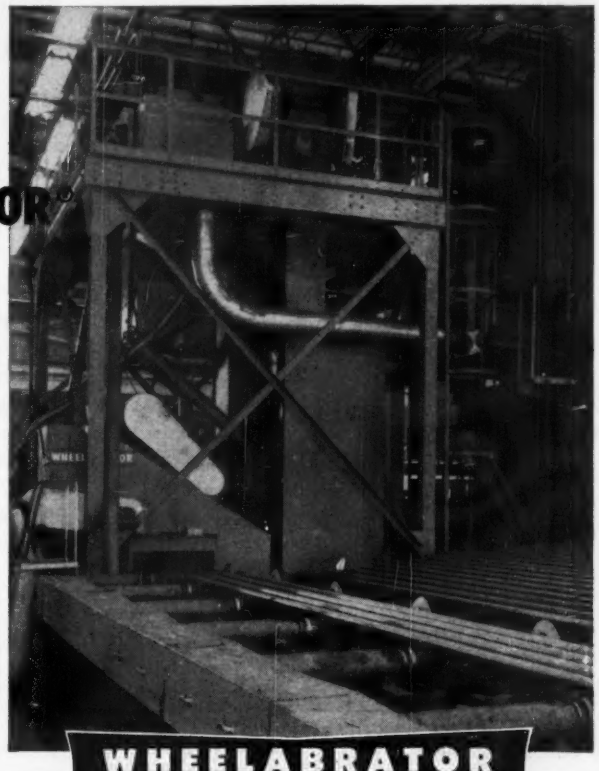
AUTOMATED DESCALING WITH THE WHEELABRATOR®

The bar stock cleaning line in the new two million dollar Elyria, Ohio, Cold Draw plant of The Western Automatic Machine Screw Co., Div. of Standard Screw Co. utilizes one of six Wheelabrator descaling machines that have completely eliminated pickling in this modern plant.

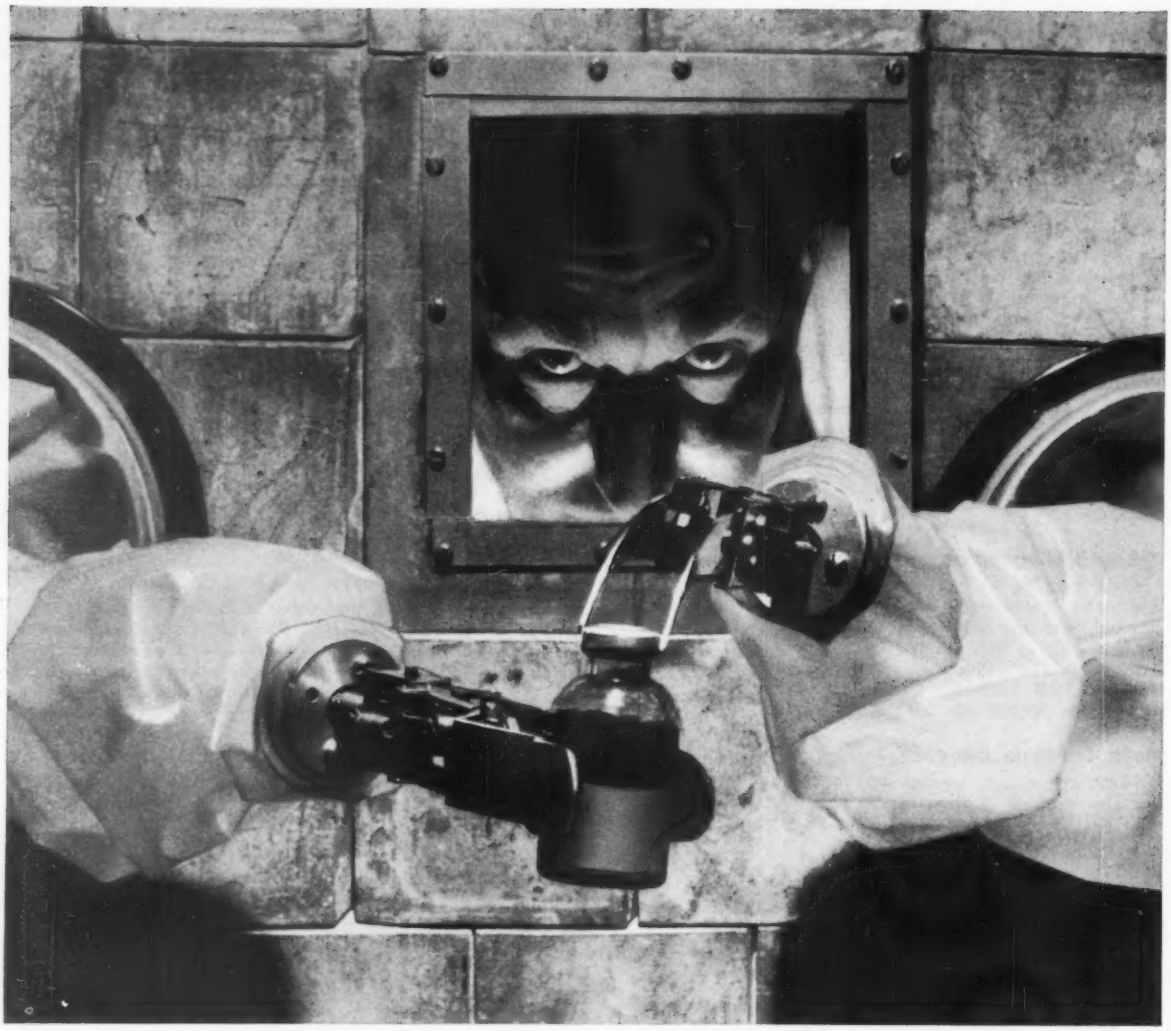
On the bar line, the Wheelabrator enables one man to handle the entire operation, from receipt of bar bundles, through an unscrambler, transfer to feed roll conveyors, through the Wheelabrator, and out onto a storage rack in line with the draw bench. For over 16 months of operation, round, square and hex bar stock, up to 4½" diameter in 15' to 45' lengths, has been descaled without any of the old acid pickling headaches. In addition, Western Automatic reports that Wheelabrator descaling provides a definitely superior product for subsequent cold drawing.

How To Automate Your Bar and Wire Drawing Lines

Details of Wheelabrator's cost-saving descaling method are illustrated in Bulletin 148-D. Write to Wheelabrator Corp., 509 S. Byrkit St., Mishawaka, Indiana. In Canada, P.O. Box 490, Scarborough, Ontario.



WHEELABRATOR
AIRLESS BLAST EQUIPMENT



PRECISE TUBING HELPS HANDLE HOT STUFF

Juggling radioactive materials takes a pair of sure hands—sure mechanical hands. Malfunctions cannot be tolerated. All components must adhere to rigid specifications and operate together perfectly. A good application for precise tubing.

We make stainless steel and nickel tubing in mechanical, aircraft, capillary and hypodermic grades in sizes up to 1 inch OD—plus an amazing variety of "specialties" such as super and "exotic" alloys, glass-to-metal sealing alloys and clad metals.

In addition, we produce a vast line of platinum products and chemicals that have been used by industry for over a century.

We are unique because of our ability to *work these metals to such tiny, precise forms.* Bulletin No. 12 describes our tubular products—Catalog No. 5 describes our platinum products. Write for them.

BISHOP

Tubular Products Division **J. BISHOP & CO.** *platinum works* 30 KING STREET, MALVERN, PENNA.

A JOHNSON MATTHEY ASSOCIATE "METALS FOR PRECISION AND PERFORMANCE"

Stretchouts Delay Steel Upturn

FAILURE of the automotive, appliance, and farm equipment industries to place substantial new orders is holding steel production down longer than most observers expected.

Unless there's a sudden shift in the purchasing plans of automakers, the September upturn in bookings and shipments may not be more than 5 per cent. A few weeks ago, one of the Big Three had tentative plans for October production at the record breaking pace of the first quarter. Now it's curtailing preliminary schedules. Another large automaker has cut its September steel buying by 25 per cent, indicating that its October purchase will be no larger.

AUTOMAKERS UNCERTAIN— The problem in Detroit seems to be one of production planning. Automakers know approximately how many cars they want to build, but they can't decide what percentage of their output should be compacts. Until they do, they're in a poor position to specify the types and sizes of steel they'll need. They're in no hurry to make up their minds because they know that steelmakers can meet their requirements on short notice.

DEALERS OVERSTOCKED— Most of the car companies intend to introduce their 1961 models by Oct. 15, but they'll go easy on initial production runs until their dealers unload at least half the 1 million 1960 cars jamming their showrooms. The inventory problem, while formidable, isn't much worse than it was a year ago. Stocks are only 5 per cent higher than they were in August, 1959. Look for the automakers to turn out 1.3 million cars in the fourth quarter (vs. 2 million in the first, 1.8 million the second, and 1 million in the third).

BUYERS' MARKET CONTINUES— As automakers delay releases, other consumers—appliance manufacturers, farm machinery builders, and canmakers—are staying out of the market because they have big inventories of finished goods and more than enough raw steel. To build their order books, steelmakers must compete vigorously for small tonnages from a host of other users—most of whom are living hand to mouth. Orders are going to the mills that can promise faster delivery, so steelmakers are carrying larger than normal inventories of semifinished and finished material. What's more, they're making concessions on freight. Customers in cities that are normally served by barge—St. Louis, Kansas City, Louisville, Cincinnati, Memphis and Nashville, Tenn., expect the mills to ship by rail and absorb the difference in freight rates.

DISTRIBUTORS UNLOAD— Since June, service centers have trimmed their inventories from an all-time high of 3.8 million tons to a level that the Steel Service Center Institute regards as normal: About 3.5 million. First half shipments are believed to have been about 4.3 million tons, or 10 per cent less than those of the corresponding period in 1959. Distributors complain that their average order size has dropped appreciably. They see only scattered signs of improvement—mostly in flat rolled products.

GALVANIZED DISAPPOINTS— Galvanized sheets, last of the flat rolled products to weaken, may also be the last to recover. Demand is still fairly strong in Chicago and the East, but Pittsburgh mills are disappointed. Reason: Orders are declining at a time when they should be at a seasonal peak.

INGOT RATE ADVANCES— Last week's steel production was the highest since mid-June. Furnaces were operated at 55.8 per cent of capacity, up 2.3 percentage points from the previous week's revised rate. Output: About 1,589,000 ingot tons.

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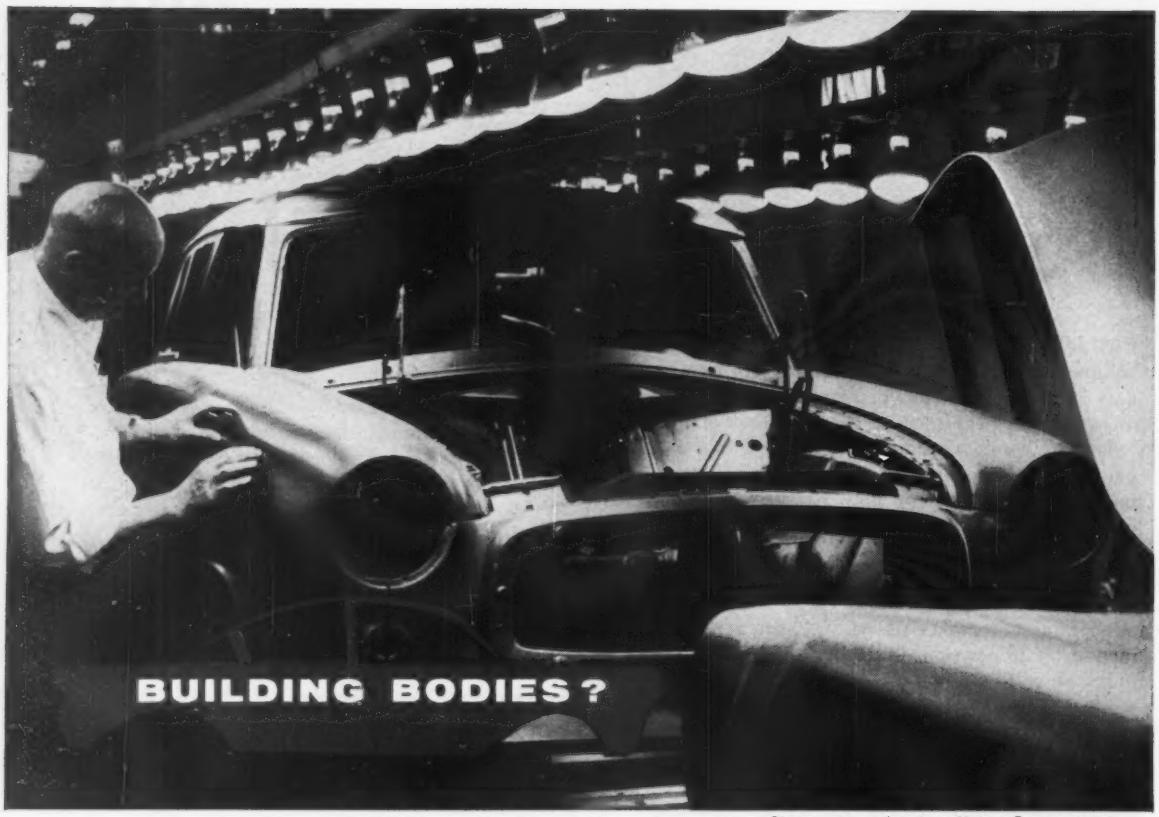
Structurals	118	110
Tin Mill Prod.	128	112
Tool Steel	118	114
Tubular Goods	118	114
Wire	118	112

*Current prices were published in the Aug. 15 issue and will appear in subsequent issues.



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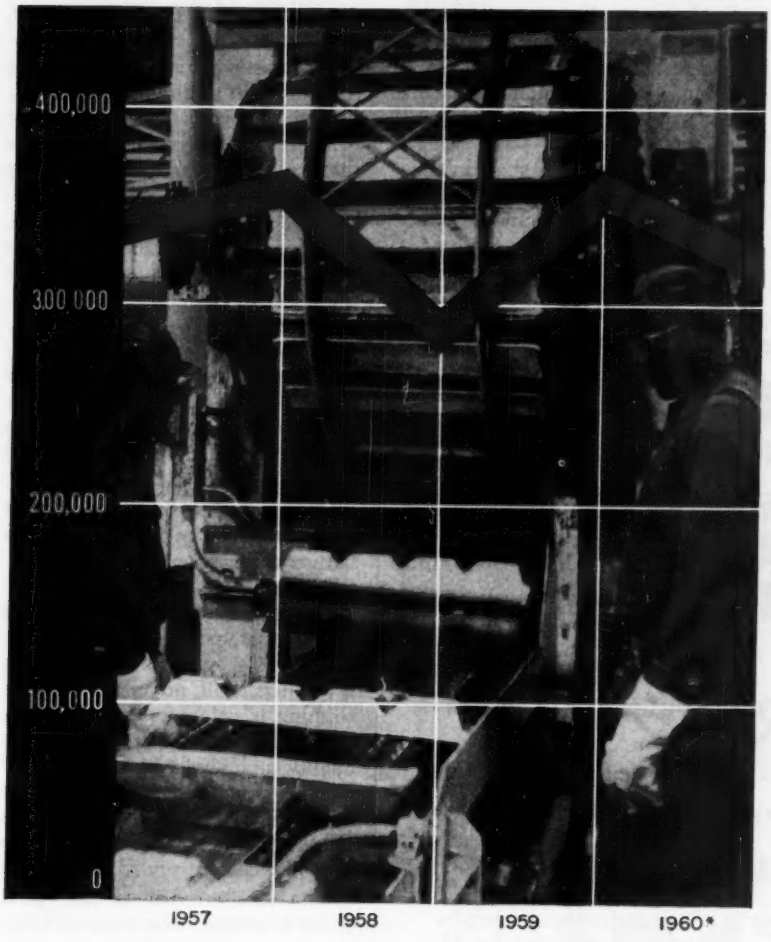

Custom Aluminum Smelters Foresee Big Market Growth

CUSTOM SMELTERS have set their sights on a bigger chunk of the aluminum market.

Smelters are already the second most important source of the metal, and they think time will help them in their expansion program. Reason: As remelters and alloyers of scrap, they have had to rely pretty much on the generation of new scrap, which, they feel, has tied them a little too closely to primary producers. In the near future, old scrap will be reclaimed in large quantities, say the smelters, giving them a guaranteed source of supply and price advantage that they don't have now.

Carl H. Burton, secretary of the Aluminum Smelters Research Institute, makes these projections: By 1965, out of a total scrap recovery of 668,000 tons, old scrap will account for 200,000 tons, or 30 per cent. (In 1959, scrap recovery was 450,000 tons, of which 100,000 tons was old scrap); by 1970, old scrap will hit 310,000 tons, or 35 per cent of the total; by 1980, it will be 675,000 tons, or 44.5 per cent of the total; and by 1990, 1.2 million tons, or 55 per cent of the total scrap generation of 2.175 million tons.

• **'60 Disappointing**—Over the last few years, smelter production has averaged about 18 to 20 per cent of primary production. Like the producers, the smelters expected a hefty upturn in demand this year. After a booming first quarter, demand turned down and has been slow ever since.

As of now, smelter production, which is virtually synonymous with sales, is running about 15 per cent under the 1959 pace. Demand is expected to pick up next month and continue strong through the year—it'll be enough of a boost, say some companies, to pull them up to their 1959 levels. On the basis of a good (but not spectacular) fourth quarter, STEEL estimates the industry will wind up the year about 10 per cent behind the 1959 mark.

• **Plenty of Capacity**—The industry can take care of practically any upsurge in demand. Capacity is 460,000 tons a year (the industry is operating at about 60 per cent now) and should reach 600,000 tons by 1965, 750,000 tons by 1970.

• **How Many**—It's a tough job to pinpoint the number of custom smelters in the country. The Business & Defense Services Administration lists 85. Some produce only deoxidizing ingots; some only extrusion billets; and some are sweaters—they make rough pigs and sell them to the smelters for further alloying. The consensus: 40 to 60 companies make alloy ingots. Six of them turn out a good half of U. S. custom smelted aluminum.

• **Three Problems**—The industry is wrestling with a trio of problems (scrap, hot metal contracts, and the difference between custom and primary prices) that could have far ranging effects on its future.

First, and foremost, is a hassle with scrap dealers over the large tonnage of aluminum scrap that has been flowing out of the U. S.

this year. Smelters argue that their existence depends on adequate, guaranteed sources of scrap. They contend: Exports, which hit 39,500 tons in the first half vs. only 11,400 tons in the like period last year, reduce the industry's sales potential.

The smelters believe there should be a reservoir of scrap in the hands of dealers so they can handle an emergency or business boom. The smelters also say that exports keep scrap prices at artificially high levels, making it tough for them to maintain the historical gap between the smelter and primary aluminum quotations.

Smelters say: If scrap prices were lower, the price of custom aluminum would be lower.

Scrap dealers maintain that exports are still a relatively small percentage of supply—that there's no reason why they shouldn't be allowed to export metal for which there's no current domestic market. So far, the U. S. government has supported the position of the dealers.

• **Hot Metal Woes**—Under a hot metal contract, a primary reduction plant locates near an automotive foundry and supplies its needs. The practice has cut into the automotive casting business, a market that has been traditionally dominated by smelters.

Some smelter executives believe the contracts represent only a temporary setback. They contend: As scrap becomes more plentiful, secondary producers can lower prices to where hot metal contracts are no longer economical.

• **Prices**—Smelters say there isn't enough gap between primary and custom prices. Smelters cite the weakness in the primary aluminum market which has led to widespread price shading in primary alloys.

Smelter executives report a minimum of price fighting in their industry this year. As one company president puts it: "Fortunately, the secondary industry has reached the point where it recognizes it has overcapacity; and that if business is off, no amount of price slashing is going to cure the problem. We're trying to sell more on quality and service than on price." Another manager estimates that while metal is going at the lowest published price, less than 20 per cent of sales are under list.

The smelters believe the price trend is toward even more stability, greater quantity discounts, and a wider gap between primary and custom prices. Says one sales vice president: "We want to make our basic price such that the foundryman or diecaster can't afford to use anything else."

• **Markets to Grow**—Odds are the custom industry won't venture far from its present markets—casting and deoxidizing applications. Metalmen think there's a world of potential here, particularly in diecastings (mainly for autos and appliances), and to a lesser extent in sand and permanent mold castings.

The smelters say they'll have these advantages going for them: 1. An ever widening range of alloys, many for problem applications. 2. An adequate supply of raw material (if scrap generation increases along the lines forecast). 3. The mobility to step up operations quickly when demand warrants it.

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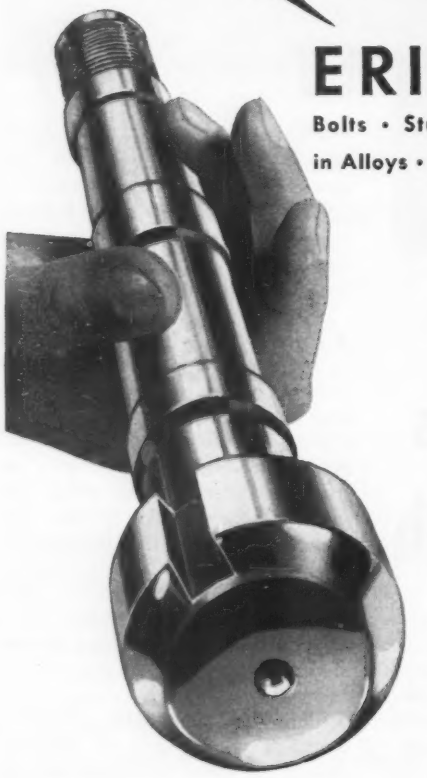

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Importers Lower Prices On Several Steel Items

Steel importers are finding the going tougher, with demand easy and supplies large. Deformed bars from Europe are down $2 a ton, while plates are off $3. European barbed wire is quoted down $2 a ton, and bright common wire nails $4.

Prices on imported sheets from Europe continue nominal, chiefly because there isn't enough trading to provide a test. Sheets are reported in strong demand in Europe, consumers there drawing tonnage from this country.

Steel imports at the port of Houston rose in July after dropping off in June to a two vear low. July tonnage totaled 29,201 vs. 25,000 in June and 40,000 in May. In July, 1959, the total was 84,000.

Of the July (1960) tonnage, 14,000 consisted of reinforcing bars.

Belgium was the leading supply source during the month, accounting for 18,000 tons. Japan was second.

Steel Bars . . .

Bar Prices, Page 110

No important gains in steel bar business are expected this month, and sellers are not too optimistic about September prospects, though they look for some improvement in orders in all grades—hot and cold rolled, and alloy.

Shipment promises on hot carbon bars average around three weeks. Where converters have hot bar stock on hand, cold finished shipments are available within a week or two. Early shipments are also available on the alloy grades.

Republic Steel Corp. has issued a revised extra card on merchant quality hot rolled bars. Dated July 18, it supersedes the list in effect since Nov. 20, 1957. Only minor changes are involved, including a reduction in size extras on small sizes of rounds, squares, and round corner squares, bringing the list in line with that on special quality bars. A change in the loading and blocking extra was also made in the revised list.

Inland Steel's rail rerolling mill at Chicago Heights, Ill., is down until Sept. 4 for installation of equipment. Capacity is being increased 75 per cent—from 80,000 to 140,000 tons annually.

Plates . . .

Plate Prices, Page 110

With plate deliveries ranging around two weeks on carbon material and four to seven weeks on alloy, producers anticipate little pickup in demand in the immediate future. Tank and boiler work is slow. Some shipwork is pending, including five cargo passenger ships for the United States Lines on which the Newport News Shipbuilding & Dry Dock Co. is low bidder. But steel for the vessels will not be required for some time.

Carbuilding continues dull. The New York Central Railroad is expected to go ahead in the fourth quarter with construction of 500 hopper cars at its Merchants Despatch shops in East Rochester, N. Y., but steel for the program has already been placed.

Demand for plates has been hurt partly by the lower volume of con-

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struction this year but mostly by the fall off in orders for tanks and freight cars.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 111 & 112

Buying of sheets continues disappointing, current orders involving small tonnages for prompt shipment. Volume is little improved from that a month ago. At best, users are beginning to buy as much steel as they're consuming, and demand for rush deliveries indicates inventory liquidation may have about run its course.

Prospects are not too promising for more than a slight gain in bookings and shipments in September, unless there's a sudden shift in auto industry purchasing plans. Right now, it looks like the automakers may buy less steel and build fewer cars this fall than originally anticipated. Their preliminary production schedules for the period are being scaled down. One large carbuilder has cut its September steel buying about 25 per cent, indicating its October purchase will be no larger.

The automakers, of course, are concerned about the huge stocks of unsold 1960 model cars in dealers' hands. Steel executives point out that the car inventories are only 5 per cent larger than they were a year ago, but there's little doubt they present a stumbling block to large scale production of the 1961 models. In any case, automotive steel demand for October undoubtedly will depend largely on

(*Please turn to Page* 118)

Steel Production in July Drops Under June Level

Production of ingots and steel for castings in July totaled 6,343,000 net tons, reports the American Iron & Steel Institute. June output was 7,404,873 tons, while production in July, 1959 (when the steel strike started), amounted to 5,232,176 tons.

Output in the first seven months of this year amounted to 67,097,095 net tons vs. 69,510,379 in the same period last year.

The institute's index of steelmaking (in terms of the basic index of average production in 1947-49) was 89.2 in July vs. 107.6 in June. The index for the first seven months this year was 137.3 vs. 142.9 for the same period of 1959.

Ingot operations averaged 50.3 per cent of capacity during July compared with 60.6 per cent during June. The average for the first seven months of the year was 77.4 per cent.

Steel Ingot Production — July, 1960

Period	OPEN HEARTH (Net tons)	BESSEMER (Net tons)	OXYGEN PROCESS (Net tons)	ELECTRIC (Net tons)	TOTAL (Net tons)	Percentage of capacity
1960						
January	10.510.616	211,132	280.931	1,046.675	12.049 404	95.5
February ...	9.715.527	215.283	245.458	949.558	11.126.806	94.3
March	10,103.122	202.812	306.741	952.008	11.564.683	91.6
1st Qtr	30.329.265	630.207	833.180	2,948.241	34.740.893	93.8
April	8.603.306	105.336	302.763	766.452	9.777.857	80.1
May	7.844.140	73,010	309,505	603.817	8,830.472	70.0
*June	6.441.594	80,344	314,766	568.169	7,404.873	60.6
*2nd Qtr. ..	22.889.040	258.690	927.034	1,938.438	26,013.202	70.2
1st Half ...	53.218.305	888.897	1,760.214	4,886.679	60.754.095	82.0
†July	5,491,000	62,000	289.000	501,000	6,343,000	50.3
1959						
January ...	8,280.985	120,005	186.820	729.575	9.317.385	74.3
February ...	8.541.031	128.515	176.970	756.422	9.602.938	84.8
March	10.216.474	184.892	236.595	929.784	11.567.745	92.3
1st Qtr	27.038.490	433.412	600.385	2,415.781	30.488.068	83.8
April	9.884.322	195.730	237.018	964.850	11,281.920	93.0
May	10,117.968	200.887	257.325	1,024.401	11.600.581	92.5
June	9.521.053	185.794	259.731	941.056	10,907.634	89.9
2nd Qtr	29.523.343	582.411	754.074	2,930.307	33.790.135	91.8
1st 6 Mo. ..	56.561.833	1,015.823	1,354.459	5,346.088	64,278,203	87.8
July	4,541.741	66,433	96,634	525.368	5,232.176	41.7
August	1,171.342	.....	.....	267.935	1,439.277	11.5
September ..	1,249.398	.....	.....	285.619	1,535.017	12.7
3rd Qtr	6.962.481	66,433	98.634	1,078.922	8.206.470	22.1
9 Mo.	63.524.314	1,082,256	1,453,093	6,425.010	72,484,673	65.6
October	1,385.490	.....	.....	319 043	1,704.533	13.6
November ..	6.290.659	92.361	129,794	754.793	7,267.607	59.9
December ..	10.468.534	205.666	281,451	1,033.668	11,989.319	95.6
4th Qtr	18,144.683	298.027	411,245	2,107.504	20.961.459	56.3
2nd 6 Mo...	25,107.164	364,460	509,879	3,186,426	29.167,929	39.2
Totals	81,668,997	1,380,283	1,864,338	8,532.514	93,446,132	63.3

Note—The percentages are based on annual capacities as of Jan. 1, 1960: Open hearth, 126,621,630 net tons; bessemer, 3,396.000 net tons; basic oxygen process, 4,157,400 net tons; electric and crucible, 14.395.940 net tons. Total: 148.570,970 net tons. In 1959, the capacity tonnages were: Open hearth, 126.528,380 net tons; bessemer, 3.577,000 net tons; basic oxygen process, 4,033,160 net tons; electric and crucible, 13,495,130 net tons. Total: 147,633,670 net tons.
†Preliminary. *Revised.

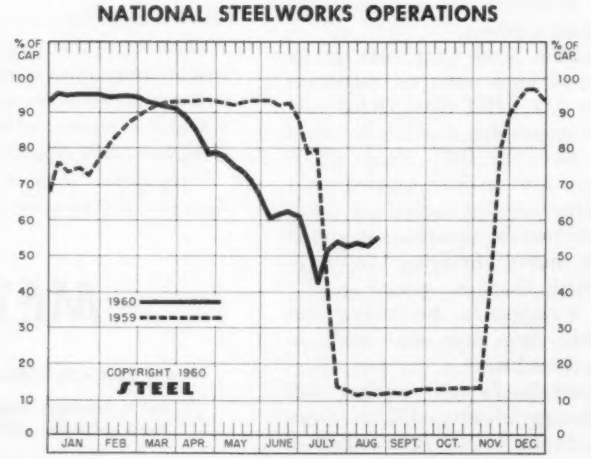
DISTRICT INGOT RATES

(Percentage of capacity utilized)

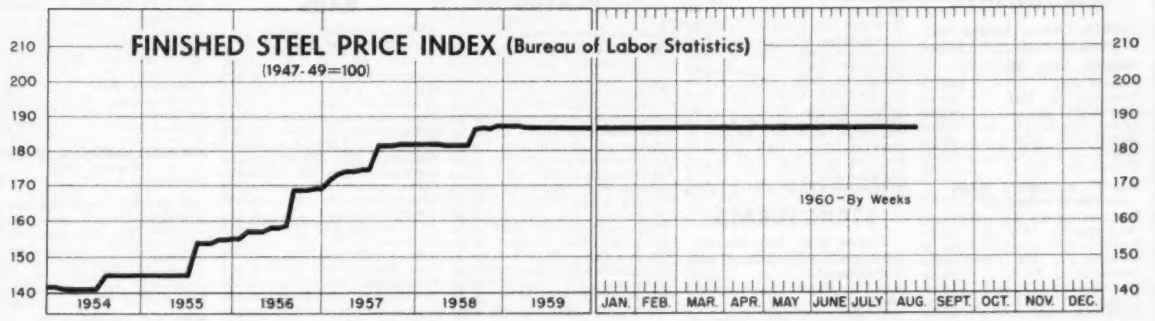
	Week Ended Aug. 21	Week Ago	Month Ago	Year Ago
Northeastern	63	59	60	*
Buffalo	58	57	56	*
Pittsburgh	51	46	48	*
Youngstown	45	47	45	*
Cleveland	50	49	48	*
Detroit	83	81	86	*
Chicago	59	57	57	*
Cincinnati	54	54	47	*
St. Louis	66	55	50	*
Southern	61	55	64	*
Western	48	47	53	*
Total Industry .	55.8	53.5	54.4	11.3
Index ..... (1947-49=100)	98.9	94.9	96.5	20.0
Net Tons ..... (In thousands)	1,589	1,525	1,550	321

Current week's figures are preliminary. Weekly capacity (net tons): 2,849,306 in 1960 and 2,831,331 in 1959. Source: American Iron & Steel Institute. *Not available due to general strike.

NATIONAL STEELWORKS OPERATIONS



Price Indexes and Composites



Aug. 16, 1960	Week Ago	Month Ago	July Index	Year Ago
186.2	186.2	186.2	186.2	186.7

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Aug. 16

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825	Bars, Reinforcing	6.335
Rails, Light, 40 lb	7.292	Bars, C.F., Carbon	10.710
Tie Plates	6.875	Bars, C.F., Alloy	14.125
Axles, Railway	10.175	Bars, C.F., Stainless, 302 (lb)	0.570
Wheels, Freight Car, 33 in. (per wheel)	62.000	Sheets, H.R., Carbon	6.350
Plates, Carbon	6.350	Sheets, C.R., Carbon	7.300
Structural Shapes	6.167	Sheets, Galvanized	8.775
Bars, Tool Steel, Carbon (lb)	0.560	Sheets, C.R., Stainless, 302 (lb)	0.658
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680	Sheets, Electrical	12.625
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400	Strip, C.R., Carbon	9.489
Bars, Tool Steel, H.R. Alloys, High Speed, W18 Cr 4, V 1 (lb)	1.895	Strip, C.R., Stainless, 430 (lb)	0.480
Bars, H.R., Alloy	10.775	Strip, H.R., Carbon	6.250
Bars, H.R., Stainless, 303 (lb)	0.543	Pipe, Black, Buttweld (100 ft)	19.495
Bars, H.R., Carbon	6.675	Pipe, Galv., Buttweld (100 ft)	23.098
		Pipe, Line (100 ft)	195.430
		Casing, Oil Well, Carbon (100 ft)	201.080
		Casing, Oil Well, Alloy (100 ft)	315.213
		Tubes, Boiler (100 ft)	51.200
		Tubing, Mechanical, Carbon (100 ft)	27.005
		Tubing, Mechanical, Stainless, 304 (100 ft)	195.395
		Tin plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100
		Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
		Black Plate, Canmaking Quality (95 lb base box)	7.900
		Wire, Drawn, Carbon	10.575
		Wire, Drawn, Stainless, 430 (lb)	0.665
		Bale Ties (bundles)	7.647
		Nails, Wire, 8d Common	9.433
		Wire, Barbed (80-rod spool)	8.414
		Woven Wire Fence (20-rod roll)	21.003

STEEL's FINISHED PRICE INDEX*

	Aug. 17 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	247.82	247.82	247.82	247.82	207.63
Index in cents per lb	6.713	6.713	6.713	6.713	5.625

STEEL's ARITHMETICAL PRICE COMPOSITES*

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$127.41
No. 2 Fdry, Pig Iron, GT.	66.49	66.49	66.49	66.49	58.99
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	58.49
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	59.77
Steelmaking Scrap, GT	32.33	32.00	31.67	38.33	44.33

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Aug. 17 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	4.65
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	4.65
Bars, H.R., deld., Philadelphia	5.975	5.975	5.975	5.975	4.90
Bars, C.R., Pittsburgh	7.65*	7.65*	7.65*	7.65*	5.90
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	4.60
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	4.60
Shapes, deld., Philadelphia	5.77	5.77	5.77	5.77	4.88
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.50
Plates, Chicago	5.30	5.30	5.30	5.30	4.50
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	4.50
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.50
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	4.50
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.325-5.425
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	5.85
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	6.317
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	6.35-6.45
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	6.35
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	6.25
Nails, Wire, nonstock, Pitts.	8.95	8.95	8.95	8.95	7.60
Tin plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.05

*Including 0.35c for special quality.

SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$84.50
Wire rods, $\frac{7}{32}$-$\frac{5}{8}$" Pitts.	6.40	6.40	6.40	6.40	5.025

PIG IRON, Gross Ton	Aug. 17 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$59.50
Basic, Valley	66.00	66.00	66.00	66.00	58.50
Basic, deld., Philadelphia	70.41	70.41	70.41	70.41	56.16
No. 2 Fdry, NevilleIsland, Pa.	66.50	66.50	66.50	66.50	59.00
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	59.00
No. 2 Fdry, deld., Phila.	70.91	70.91	70.91	70.91	59.66
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	55.00
No. 2 Fdry (Birm.), deld., Cin.	70.20	70.20	70.20	70.20	62.70
Malleable, Valley	66.50	66.50	66.50	66.50	59.00
Malleable, Chicago	66.50	66.50	66.50	66.50	59.00
Ferromanganese, net tons†	245.00	245.00	245.00	245.00	190.00

†74-76% Mn, Duquesne, Pa.

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pittsburgh	$30.50	$30.50	$30.50	$38.50	$44.50
No. 1 Heavy Melt, E. Pa.	35.00	34.00	34.00	40.00	46.00
No. 1 Heavy Melt, Chicago	31.50	31.50	30.50	36.50	42.00
No. 1 Heavy Melt, Valley	33.50	33.50	33.50	41.50	46.50
No. 1 Heavy Melt, Cleve.	31.50	31.50	31.50	38.50	44.00
No. 1 Heavy Melt, Buffalo	29.50	29.50	29.50	33.50	39.50
Rails, Rerolling, Chicago	53.50	53.50	49.50	61.50	64.50
No. 1 Cast, Chicago	42.50	42.50	40.50	53.50	46.50

COKE, Net Ton					
Beehive, Furn., Connisvl.	$15.00	$15.00	$15.00	$15.00	$13.625
Beehive, Fdry., Connisvl.	18.25	18.25	18.25	18.25	16.50
Oven, Fdry., Milwaukee	32.00	32.00	32.00	32.00	26.25

Steel Prices

Mill prices as reported to STEEL, Aug. 17, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 111; footnotes, page 113.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)
Munhall,Pa. U5 ....$76.00

INGOTS, Alloy (NT)
Detroit S41 ....$82.00
Economy,Pa. B14 ....82.00
Farrell,Pa. S3 ....82.00
Lowellville,O. S3 ....82.00
Midland,Pa. C18 ....82.00
Munhall,Pa. U5 ....82.00
Sharon,Pa. S3 ....82.00

BILLETS, BLOOMS & SLABS
Carbon Rerolling (NT)
Bartonville,Ill. K4 ....$82.00
Bessemer,Pa. U5 ....80.00
Buffalo R2 ....80.00
Clairton,Pa. U5 ....80.00
Ensley,Ala. T2 ....80.00
Fairfield,Ala. T2 ....80.00
Fontana,Calif. K1 ....90.50
Gary,Ind. U5 ....80.00
Johnstown,Pa. B2 ....80.00
Lackawanna,N.Y. B2 ....80.00
Munhall,Pa. U5 ....80.00
Owensboro,Ky. G8 ....80.00
S.Chicago,Ill. R2, U5 ....80.00
S.Duquesne,Pa. U5 ....80.00
Sterling,Ill. N15 ....80.00
Youngstown R2 ....80.00

Carbon, Forging (NT)
Bessemer,Pa. U5 ....$99.50
Buffalo R2 ....99.50
Canton,O. R2 ....102.00
Clairton,Pa. U5 ....99.50
Conshohocken,Pa. A3 ....104.50
Ensley,Ala. T2 ....99.50
Fairfield,Ala. T2 ....99.50
Farrell,Pa. S3 ....99.50
Fontana,Calif. K1 ....109.00
Gary,Ind. U5 ....99.50
Geneva,Utah C11 ....99.50
Houston S5 ....104.50
Johnstown,Pa. B2 ....99.50
Lackawanna,N.Y. B2 ....99.50
LosAngeles B3 ....109.00
Midland,Pa. C18 ....99.50
Munhall,Pa. U5 ....99.50
Owensboro,Ky. G8 ....99.50
Seattle B3 ....109.00
Sharon,Pa. S3 ....99.50
S.Chicago R2, U5, W14 ....99.50
S.Duquesne,Pa. U5 ....99.50
S.SanFrancisco B3 ....109.00
Warren,O. C17 ....99.50

Alloy, Forging (NT)
Bethlehem,Pa. B2 ....$119.00
Bridgeport,Conn. C32 ....119.00
Buffalo R2 ....119.00
Canton,O. R2, T7 ....119.00
Conshohocken,Pa. A3 ....126.00
Detroit S41 ....119.00
Economy,Pa. B14 ....119.00
Farrell,Pa. S3 ....119.00
Fontana,Calif. K1 ....140.00
Gary,Ind. U5 ....119.00
Houston S5 ....124.00
Ind.Harbor,Ind. Y1 ....119.00
Johnstown,Pa. B2 ....119.00
Lackawanna,N.Y. B2 ....119.00
LosAngeles B3 ....139.00
Lowellville,O. S3 ....119.00
Massillon,O. R2 ....119.00
Midland,Pa. C18 ....119.00
Munhall,Pa. U5 ....119.00
Owensboro,Ky. G8 ....119.00
Sharon,Pa. S3 ....119.00
S.Chicago R2,U5,W14 ....119.00
S.Duquesne,Pa. U5 ....119.00
Struthers,O. Y1 ....119.00
Warren,O. C17 ....119.00

ROUNDS, SEAMLESS TUBE (NT)
Buffalo R2 ....$122.50
Canton,O. R2 ....125.00
Cleveland R2 ....122.50
Gary,Ind. U5 ....122.50
S.Chicago,Ill. R2,W14 ....122.50
S.Duquesne,Pa. U5 ....122.50
Warren,O. C17 ....122.50

SKELP
Aliquippa,Pa. J5 ....5.05
Benwood,W.Va. W10 ....5.05
Ind.Harbor,Ind. Y1 ....5.05
Munhall,Pa. U5 ....5.05
Pittsburgh J5 ....5.05
Warren,O. R2 ....5.05
Youngstown R2, U5 ....5.05

WIRE RODS
AlabamaCity,Ala. R2 ..6.40
Aliquippa,Pa. J5 ....6.40
Alton,Ill. L1 ....6.60
Bartonville,Ill. K4 ....6.50
Buffalo W12 ....6.40
Cleveland A7 ....6.40
Donora,Pa. A7 ....6.40
Fairfield,Ala. T2 ....6.40
Houston S5 ....6.65
IndianaHarbor,Ind. Y1 ..6.40
Johnstown,Pa. B2 ....6.40
Joliet,Ill. A7 ....6.40
KansasCity,Mo. S5 ....6.65
Kokomo,Ind. C16 ....6.50
LosAngeles B3 ....7.20
Minnequa,Colo. C10 ....6.65
Monessen,Pa. P7 ....6.40
Pittsburg,Calif. C11 ..7.20
Portsmouth,O. P12 ....6.40
Roebling,N.J. R5 ....6.50
S.Chicago,Ill. R2, W14 ..6.40
SparrowsPoint,Md. B2 ..6.50
Sterling,Ill.(1) N15 ....6.40
Sterling,Ill. N15 ....6.50
Struthers,O. Y1 ....6.40
Worcester,Mass. A7 ....6.70

STRUCTURALS

Carbon Steel Std. Shapes
AlabamaCity,Ala. R2 ...5.50
Aliquippa,Pa. J5 ....5.50
Atlanta A11 ....5.70
Bessemer,Ala. T2 ....5.50
Bethlehem,Pa. B2 ....5.55
Birmingham C15 ....5.50
Clairton,Pa. U5 ....5.50
Fairfield,Ala. T2 ....5.50
Fontana,Calif. K1 ....o.30
Gary,Ind. U5 ....5.50
Geneva,Utah C11 ....5.50
Houston S5 ....5.60
Ind.Harbor,Ind. I-2, Y1..5.50
Johnstown,Pa. B2 ....5.55
Joliet,Ill. P22 ....5.50
KansasCity,Mo. S5 ....5.60
Lackawanna,N.Y. B2 ..5.55
LosAngeles B3 ....6.20
Minnequa,Colo. C10 ....5.80
Munhall,Pa. U5 ....5.50
Niles,Calif. P1 ....6.25
Phoenixville,Pa. P4 ....5.55
Portland,Oreg. O4 ....6.25
Seattle B3 ....6.25
S.Chicago,Ill. U5, W14 ..5.50
S.SanFrancisco B3 ....6.15
Sterling,Ill. N15 ....5.50
Torrance,Calif. C11 ....6.20
Weirton,W.Va. W6 ....5.50

Wide Flange
Bethlehem,Pa. B2 ....5.55
Clairton,Pa. U5 ....5.50
Fontana,Calif. K1 ....6.45
IndianaHarbor,Ind. I-2..5.50
Lackawanna,N.Y. B2 ..5.55
Munhall,Pa. U5 ....5.50
Phoenixville,Pa. P4 ....5.55
S.Chicago,Ill. U5 ....5.50
Sterling,Ill. N15 ....5.50
Weirton,W.Va. W6 ....5.50

Alloy Std. Shapes
Aliquippa,Pa. J5 ....6.80
Clairton,Pa. U5 ....6.80
Gary,Ind. U5 ....6.80
Houston S5 ....6.90
Munhall,Pa. U5 ....6.80
S.Chicago,Ill. U5, W14..6.80

H.S., L.A., Std. Shapes
Aliquippa,Pa. J5 ....8.05
Bessemer,Ala. T2 ....8.05
Bethlehem,Pa. B2 ....8.10
Clairton,Pa. U5 ....8.05
Fairfield,Ala. T2 ....8.05
Fontana,Calif. K1 ....8.85
Gary,Ind. U5 ....8.05
Geneva,Utah C11 ....8.05
Houston S5 ....8.15
Ind.Harbor,Ind. I-2, Y1..8.05
Johnstown,Pa. B2 ....8.10
KansasCity,Mo. S5 ....8.15
Lackawanna,N.Y. B2 ..8.10
LosAngeles B3 ....8.15
Munhall,Pa. U5 ....8.05
Seattle B3 ....8.80
S.Chicago,Ill. U5, W14..8.05
S.SanFrancisco B3 ....8.70
Sterling,Ill. N15 ....7.75
Struthers,O. Y1 ....8.05

H.S., L.A., Wide Flange
Bethlehem,Pa. B2 ....8.10
Ind.Harbor,Ind. I-2 ....8.05
Lackawanna,N.Y. B2 ..8.10
Munhall,Pa. U5 ....8.05
S.Chicago,Ill. U5 ....8.05
Sterling,Ill. N15 ....7.75

PILING

BEARING PILES
Bethlehem,Pa. B2 ....5.55
Ind.Harbor,Ind. I-2 ....5.50
Lackawanna,N.Y. B2 ..5.55
Munhall,Pa. U5 ....5.50
S.Chicago,Ill. I-2, U5 ..5.50

STEEL SHEET PILING
Ind.Harbor,Ind. I-2 ....6.50
Lackawanna,N.Y. B2 ..6.50
Munhall,Pa. U5 ....6.50
S.Chicago,Ill. I-2, U5 ..6.50
Weirton,W.Va. W6 ....6.50

PLATES

PLATES, Carbon Steel
AlabamaCity,Ala. R2 ..5.30
Aliquippa,Pa. J5 ....5.30
Ashland,Ky.(15) A10 ...5.30
Atlanta A11 ....5.50
Bessemer,Ala. T2 ....5.30
Clairton,Pa. U5 ....5.30
Claymont,Del. C22 ....5.30
Cleveland J5, R2 ....5.30
Coatesville,Pa. L7 ....5.30
Conshohocken,Pa. A3 ..5.30
Ecorse,Mich. G5 ....5.30
Fairfield,Ala. T2 ....5.30
Farrell,Pa. S3 ....5.30
Fontana,Calif.(30) K1 ..6.10
Gary,Ind. U5 ....5.30
Geneva,Utah C11 ....5.30
GraniteCity,Ill. G4 ....5.40
Harrisburg,Pa. P4 ....5.30
Houston S5 ....5.40
Ind.Harbor,Ind. I-2, Y1..5.30
Johnstown,Pa. B2 ....5.30
Lackawanna,N.Y. B2 ..5.30
Mansfield,O. E6 ....5.30
Minnequa,Colo. C10 ....6.15
Munhall,Pa. U5 ....5.30
Newport,Ky. A2 ....5.30
Pittsburgh J5 ....5.30
Riverdale,Ill. A1 ....5.30
Seattle B3 ....6.20
Sharon,Pa. S3 ....5.30
S.Chicago,Ill. U5, W14 ..5.30
SparrowsPoint,Md. B2 ..5.30
Sterling,Ill. N15 ....5.30
Steubenville,O. W10 ....5.30
Warren,O. R2 ....5.30
Youngstown U5, Y1 ....5.30
Youngstown(27) R2 ....5.30

PLATES, Carbon Abras. Resist.
Claymont,Del. C22 ....7.05
Fontana,Calif. K1 ....7.85
Geneva,Utah C11 ....7.05
Houston S5 ....7.15
Johnstown,Pa. B2 ....7.05
SparrowsPoint,Md. B2 ..7.05

PLATES, Wrought Iron
Economy,Pa. B14 ....14.10

PLATES, H.S., L.A.
Aliquippa,Pa. J5 ....7.95
Ashland,Ky. A10 ....7.95
Bessemer,Ala. T2 ....7.95
Clairton,Pa. U5 ....7.95
Claymont,Del. C22 ....7.95
Cleveland J5, R2 ....7.95
Coatesville,Pa. L7 ....7.95
Conshohocken,Pa. A3 ..7.95
Economy,Pa. B14 ....7.95
Ecorse,Mich. G5 ....7.95
Fairfield,Ala. T2 ....7.95
Farrell,Pa. S3 ....7.95
Fontana,Calif.(30) K1 ..8.75
Gary,Ind. U5 ....7.95
Geneva,Utah C11 ....7.95
Houston S5 ....8.05
Ind.Harbor,Ind. I-2, Y1..7.95
Johnstown,Pa. B2 ....7.96
Munhall,Pa. U5 ....7.95
Pittsburgh J5 ....7.95
Seattle B3 ....8.55
Sharon,Pa. S3 ....7.95
S.Chicago,Ill. U5, W14..7.95
SparrowsPoint,Md. B2 ..7.95
Sterling,Ill. N15 ....7.625
Warren,O. R2 ....7.95
Youngstown U5, Y1 ....7.95

PLATES, Alloy
Aliquippa,Pa. J5 ....7.50
Claymont,Del. C22 ....7.50
Coatesville,Pa. L7 ....7.50
Economy,Pa. B14 ....7.50
Farrell,Pa. S3 ....7.50
Fontana,Calif. K1 ....8.30
Gary,Ind. U5 ....7.50
Houston S5 ....7.60
Ind.Harbor,Ind. Y1 ....7.50
Johnstown,Pa. B2 ....7.50
Lowellville,O. S3 ....7.50
Munhall,Pa. U5 ....7.50
Newport,Ky. A2 ....7.50
Pittsburgh J5 ....7.50
Seattle B3 ....8.40
Sharon,Pa. S3 ....7.50
S.Chicago,Ill. U5, W14..7.50
SparrowsPoint,Md. B2 ..7.50
Youngstown Y1 ....7.50

FLOOR PLATES
Cleveland J5 ....6.375
Conshohocken,Pa. A3 ..6.375
Ind.Harbor,Ind. I-2 ...6.375
Munhall,Pa. U5 ....6.375
Pittsburgh J5 ....6.375
S.Chicago,Ill. U5 ....6.375

PLATES, Ingot Iron
Ashland c.l.(15) A10 ..5.55
Ashland l.c.l.(15) A10 ..6.05
Cleveland c.l. R2 ....6.05
Warren,O. R2 ....6.05

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)
Ala.City,Ala.(9) R2 ...5.675
Aliquippa,Pa.(9) J5 ...5.675
Alton,Ill. L1 ....5.875
Atlanta(9) A11 ....5.875
Bessemer,Ala.(9) T2 ..5.675
Birmingham(9) C15 ...5.675
Buffalo(9) R2 ....5.675
Canton,O.(23) R2 ....6.15
Clairton,Pa.(9) U5 ....5.675
Cleveland(9) R2 ....5.675
Ecorse,Mich.(9) G5 ...5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala.(9) T2 ..5.675
Fairless,Pa.(9) U5 ...5.825
Fontana,Calif.(9) K1 ..6.375
Gary,Ind.(9) U5 ....5.675
Houston(9) S5 ....5.925
Ind.Harbor(9) I-2, Y1..5.675
Johnstown,Pa.(9) B2 ..5.675
Joliet,Ill. P2 ....5.675
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ...5.675
LosAngeles(9) B3 ....6.375
Massillon,O.(23) R2 ....6.15
Midland,Pa.(23) C18 ...6.025
Milton,Pa. M18 ....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 ....6.375
Owensboro,Ky.(9) G8 ..6.025
Pittsburg,Calif.(9) C11..6.375
Pittsburgh(9) J5 ....5.675
Portland,Oreg. O4 ....6.425
Riverdale,Ill.(9) A1...5.675
Seattle(9) A24,B3,N15 .6.425
S.Ch'c'go(9)R2,U5,W14 5.675
S.Duquesne,Pa.(9) U5..5.675
S.SanFran.,Calif.(9)B3 6.425
Sterling,Ill.(1)(9) N15..5.675
Sterling,Ill.(9) N15 ...5.775
Struthers,O.(9) Y1 ....5.675
Tonawanda,N.Y. B12 ..5.675
Torrance,Calif.(9) C11 .6.375
Warren,O. C17 ....6.025
Youngstown(9) R2,U5..5.675

BARS, Hot-Rolled Alloy
Aliquippa,Pa. J5 ....6.725
Bethlehem,Pa. B2 ....6.725
Bridgeport,Conn. C32 ...6.80
Buffalo R2 ....6.725
Canton,O. R2, T7 ....6.725
Clairton,Pa. U5 ....6.725
Detroit S41 ....6.725
Economy,Pa. B14 ....6.725
Ecorse,Mich. G5 ....6.725
Fairless,Pa. U5 ....6.875
Farrell,Pa. S3 ....6.725
Fontana,Calif. K1 ....7.775
Gary,Ind. U5 ....6.725
Houston S5 ....6.975
Ind.Harbor,Ind. I-2, Y1 6.725
Johnstown,Pa. B2 ....6.725
KansasCity,Mo. S5 ...6.975
Lackawanna,N.Y. B2 ..6.725
LosAngeles B3 ....7.775
Lowellville,O. S3 ....6.725
Massillon,O. R2 ....6.725
Midland,Pa. C18 ....6.725
Owensboro,Ky. G8 ....6.725
Pittsburgh J5 ....6.725
Sharon,Pa. S3 ....6.725
S.Chicago R2, U5, W14..6.725
S.Duquesne,Pa. U5 ....6.725
Struthers,O. Y1 ....6.725
Warren,O. C17 ....6.725
Youngstown U5 ....6.725

BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy
Aliquippa,Pa. J5 ....8.30
Bessemer,Ala. T2 ....8.30
Bethlehem,Pa. B2 ....8.30
Clairton,Pa. U5 ....8.30
Cleveland R2 ....8.30
Ecorse,Mich. G5 ....8.30
Fairfield,Ala. T2 ....8.30
Fontana,Calif. K1 ....9.00
Gary,Ind. U5 ....8.30
Houston S5 ....8.55
Ind.Harbor,Ind. Y1 ....8.30
Johnstown,Pa. B2 ....8.30
KansasCity,Mo. S5 ....8.55
Lackawanna,N.Y. B2 ..8.30
LosAngeles B3 ....9.00
Pittsburgh J5 ....8.30
Seattle B3 ....9.05
S.Chicago,Ill. R2, W14..8.30
S.Duquesne,Pa. U5 ....8.30
S SanFrancisco B3 ....9.05
Sterling,Ill. N15 ....7.925
Struthers,O. Y1 ....8.30
Youngstown U5 ....8.30

BAR SIZE ANGLES; H.R. Carbon
Bethlehem,Pa.(9) B2 ..5.825
Houston(9) S5 ....5.925
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ...5.675
Sterling,Ill. N15 ....5.775
Sterling,Ill.(1) N15 ...5.675
Tonawanda,N.Y. B12 ..5.675

BAR SIZE ANGLES; S. SHAPES
Aliquippa,Pa. J5 ....5.675
Atlanta A11 ....5.875
Joliet,Ill. P22 ....5.675
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 ....6.375
Pittsburgh J5 ....5.675
Portland,Oreg. O4 ....6.425
SanFrancisco S7 ....6.52
Seattle B3 ....6.425

BAR SIZE ANGLES; S. SHAPES
Wrought Iron
Economy,Pa. B14 ....16.45

BAR SHAPES, Hot-Rolled Alloy
Aliquippa,Pa. J5 ....6.80
Clairton,Pa. U5 ....6.80
Gary,Ind. U5 ....6.80
Houston S5 ....7.05
KansasCity,Mo. S5 ....7.05
Pittsburgh J5 ....6.80
Youngstown U5 ....6.80

BARS, C.F. Loaded (Including loaded extra)
Carbon
LosAngeles P2, S30 ..11.75*
Alloy
Ambridge,Pa. W18 ...10.175
BeaverFalls,Pa. M12..10.175
Camden,N.J. P13 ....10.35
Chicago W18 ....10.175
Elyria,O. W8 ....10.175
Monaca,Pa. S17 ....10.175
Newark,N.J. W18 ....10.35
SpringCity,Pa. K3 ....10.35

*Grade A; add 0.5c for Grade B.

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 ....7.65
BeaverFalls,Pa. M12,R2 7.65
Birmingham C15 ....8.25
Buffalo B5 ....7.70
Camden,N.J. P13 ....8.10
Carnegie,Pa. C12 ....7.65
Chicago W18 ....7.65
Cleveland A7, C20 ....7.65
Detroit B5, P17 ....7.85
Detroit S41 ....7.65
Donora,Pa. A7 ....7.65
Elyria,O. W8 ....7.65
FranklinPark,Ill. N5 ....7.65
Gary,Ind. R2 ....7.65
GreenBay,Wis. F7 ....7.65
Hammond,Ind. J5, L2 ..7.85
Hartford,Conn. R2 ....8.15
Harvey,Ill. B5 ....7.65
LosAngeles(49) S30 ....9.10
LosAngeles(49) P2, R2..9.10
Mansfield,Mass. B5 ....8.20
Massillon,O. R2, R8 ....7.65
Midland,Pa. C18 ....7.65
Monaca,Pa. S17 ....7.65
Newark,N.J. W18 ....8.10
NewCastle,Pa.(17) B4 ..7.65
Pittsburgh J5 ....7.65
Plymouth,Mich. P5 ....7.90
Putnam,Conn. W18 ....8.20
Readville,Mass. C14 ....8.20
S.Chicago,Ill. W14 ....7.65
SpringCity,Pa. K3 ....8.10
Struthers,O. Y1 ....7.65
Warren,O. C17 ....7.65
Waukegan,Ill. A7 ....7.65
Willimantic,Conn. J5 ....8.15
Youngstown F3, Y1 ....7.65

BARS, Cold-Finished Carbon (Turned and Ground)
Cumberland,Md.(5) C19..6.55

BARS, Cold-Finished Alloy
Ambridge,Pa. W18 ....9.025
BeaverFalls,Pa.M12,R2 9.025
Bethlehem,Pa. B2 ....9.025
Bridgeport,Conn. C32 ..9.175
Buffalo B5 ....9.025
Camden,N.J. P13 ....9.20
Canton,O. T7 ....9.025
Carnegie,Pa. C12 ....9.025
Chicago W18 ....9.025
Cleveland A7, C20 ....9.025
Detroit B5, P17 ....9.225
Detroit S41 ....9.025
Donora,Pa. A7 ....9.025
Elyria,O. W8 ....9.025
FranklinPark,Ill. N5 ..9.025
Gary,Ind. R2 ....9.025
GreenBay,Wis. F7 ....9.025
Hammond,Ind. J5, L2..9.025
Hartford,Conn. R2 ....9.325
Harvey,Ill. R5 ....9.025
Lackawanna,N.Y. B3 ..9.025
LosAngeles P2, S30 ...11.00
Mansfield,Mass. B5 ...9.325
Massillon,O. R2, R8 ...9.025
Midland,Pa. C18 ....9.025
Monaca,Pa. S17 ....9.025
Newark,N.J. W18 ....9.20
Plymouth,Mich. P5 ...9.225
S.Chicago,Ill. W14 ....9.025
SpringCity,Pa. K3 ....9.20
Struthers,O. Y1 ....9.025

Warren,O. C17 .. .. ..9.025
Waukegan,Ill A7 ....9.025
Willimantic,Conn. J5 ..9.325
Worcester,Mass. A7 ...9.325
Youngstown F3, Y1 .. 9.025

BARS, Reinforcing, Billet (To Fabricators)

AlabamaCity,Ala. R2 ..5.675
Atlanta A11 .....5.25
Birmingham C15 .....5.25
Buffalo R2 .....5.675
Cleveland R2 .....5.675
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala. T2 .....5.675
Fairless,Pa. U5 .....5.825
Fontana,Calif. K1 ....6.375
Ft. Worth,Tex.(26) T4 ..5.25
Gary,Ind. U5 .....5.675
Houston S5 .....5.675
Ind.Harbor,Ind. I-2,Y1.5.675
Johnstown,Pa. B2 .....5.675
Joliet,Ill. P22 .....5.675
KansasCity,Mo. S5 ....5.675
Kokomo,Ind. C16 .....5.775
Lackawanna,N.Y. B2 ..5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.875
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ..6.125
Niles,Calif. P1 .....6.375
Pittsburg,Calif. C11 ..6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 ....6.425
SandSprings,Okla. S5 ..5.675
Seattle A24, B3, N14..6.425
S.Chicago,Ill. R2, W14.5.675
S.Duquesne,Pa. U5 ....5.675
S.SanFrancisco B3 ....6.425
SparrowsPoint,Md. B2..5.675
Sterling,Ill.(1) N15 ..5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 ..6.10
Torrance,Calif. C11 ...6.375
Youngstown R2, U5 ..5.675

BARS, Reinforcing, Billet (Fabricated: To Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Houston S5 .....7.35
Johnstown,Pa. B2 .....7.33
KansasCity,Mo. S5 ....7.35
Lackawanna,N.Y. B2 ..7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 .....7.35
SandSprings,Okla. S5 ..7.35
Seattle A24, B3, N14 ..7.95
SparrowsPt.,Md. B2 ...7.33
St.Paul U8 .....8.17
Williamsport,Pa. S19 ...7.25

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 15.10
Economy,Pa.(D.R.)B14 19.30
Econ.(DirectRolled)B14 13.55
Economy(Staybolt)B14 19.80
McK.Rks.(S.R.) L5 ...14.50
McK.Rks.(D.R.) L5 ...19.80
McK.Rks.(Staybolt)L5. 20.95

BARS, Rail Steel

ChicagoHts.(3) C2, I-2.5.575
ChicagoHts.(4)(44) I-2.5.675
ChicagoHts.(4) C2 ....5.675
Franklin,Pa.(3) F5 ...5.575
Franklin,Pa.(4) F5 ...5.675
JerseyShore,Pa.(3) J8 ...5.55
Marion,O.(3) P11 .....5.575
Tonawanda(3) B12 ....5.575
Tonawanda(4) B12 .....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ..5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ....5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit(8) M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 .....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ..5.20
Ind.Harbor,Ind. I-2, Y1.5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ..5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 .....5.10
Pittsburg,Calif. C11 ....5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 ....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14..5.10
SparrowsPoint,Md. B2 ..5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 .....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21, S3 .....6.275

SHEETS, H.R. Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 ....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 .....8.25
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(35) B2 ..7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14..7.525
Sharon,Pa. S3 .....7.525
SparrowsPoint(36) B2..7.525
Warren,O. R2 .....7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ...7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ...5.35
Cleveland R2 .....5.875
Warren,O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....7.05
Middletown,O. A10 ....6.775
Warren,O. R2 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 ..6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 .....6.275
Cleveland J5, R2 .....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. F4 ..6.275
Fontana,Calif. K1 .....7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ..6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 ....6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. C11 ...7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 ....6.275
SparrowsPoint,Md. B2..6.275
Steubenville,O. W10 ...6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 ....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(38) B2 ..9.275
Pittsburgh J5 .....9.275
SparrowsPoint(33) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.225	....
Ashland,Ky. A10	7.225	7.475
Canton,O. R2	7.225	....
Fairfield,Ala. T2	7.225	7.475
Gary,Ind. U5	7.225	7.475
GraniteCity,Ill.G4	7.325	....
Ind.Harbor I-2	7.225	7.475
Irvin,Pa. U5	7.225	7.475
Kokomo,Ind. C16	7.325	....
MartinsFry. W10	7.225	7.475
Pitts.,Calif. C11	7.975	....
Pittsburgh J5	7.225	....
SparrowsPt. B2	7.225	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ...7.475

SHEETS, Galvanized Steel Hot-Dipped

AlabamaCity,Ala. R2..6.875‡
Ashland,Ky. A10 ....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 ....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ...6.975*
Ind.Harbor,Ind. I-2 ..6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C16 ....6.975‡
MartinsFerry,O. W10..6.875*
Middletown,O. A10 ..6.875†
Pittsburg,Calif. C11 ...7.625*
Pittsburgh J5 .....6.875†
SparrowsPt.,Md. B2 ..6.875†
Warren,O. R2 .....6.875†
Weirton,W.Va. W6 ..6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 ..10.025

SHEETS, Galvanized Steel

Canton,O. R2 .....7.275
Irvin,Pa. U5 .....7.275

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....7.125
Middletown,O. A10 ....7.125

SHEETS, Electrogalvanized

Cleveland(28) R2 .....7.65
Niles,O.(28) R2 .....7.65
Weirton,W.Va. W6 ....7.50
Youngstown J5 .....7.50

SHEETS, Well Casing

Fontana,Calif. K1 ....7.325

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 9.525
Butler,Pa. A10 (type 2) 9.625
Irvin,Pa. U5 (type 1)..9.525

SHEETS, Enameling

Ashland,Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 .....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles,O. M21, S3 .....6.775
SparrowsPoint,Md. B2..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Ind.Harbor,Ind. I-2 ....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Long Terne, Steel (Commercial Quality)

BeechBottom,W.Va.W10 7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3.....7.225
Warren,O. R2 .....7.225
Weirton,W.Va. W6 ....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.625

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A24 Alaska Steel Mills Inc.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Plant, Wickwire Spencer Steel Div., Colo. Fuel & Iron
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N.Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div. Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.
M23 Mill Strip Products Co. of Pennsylvania

N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N20 Neville Ferro Alloy Co.

O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P24 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div.,EatonMfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forging Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Div., Bliss & Laughlin Inc.
S40 Seneca Steel Service
S41 Stainless & Strip Div., J & L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America

T2 Tenn. Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Products & Chemical Corp.
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope Corp.
U4 Universal-Cyclops Steel
U5 U. S. Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.

V2 Vanadium-Alloys Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2	5.10
Allenport,Pa. P7	5.10
Alton Ill. L1	5.30
Ashland,Ky.(8) A10	5.10
Atlanta A11	5.10
Bessemer,Ala. T2	5.10
Birmingham C15	5.10
Conshohocken,Pa. A3	5.15
Detroit M1	5.10
Ecorse,Mich. G5	5.10
Fairfield,Ala. T2	5.10
Farrell,Pa. S3	5.10
Fontana,Calif. K1	5.825
Gary,Ind. U5	5.10
Ind.Harbor,Ind. I-2, Y1	5.10
Johnstown,Pa.(25) B2	5.10
Lackaw'na,N.Y.(25) B2	5.10
LosAngeles(25) B3	5.85
LosAngeles C1	8.60
Minnequa,Colo. C10	6.20
Riverdale,Ill. A1	5.10
SanFrancisco S7	6.60
Seattle(25) B3	6.10
Seattle N14	6.60
Sharon,Pa. S3	5.10
S.Chicago,Ill. W14	5.10
S.SanFrancisco(25) B3	5.85
SparrowsPoint,Md. B2	5.10
Torrance,Calif. C11	5.85
Warren,O. R2	5.10
Weirton,W.Va. W6	5.10
Youngstown U5	5.10

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18	8.40
Farrell,Pa. S3	8.40
Gary,Ind. U5	8.40
Houston S5	8.65
Ind.Harbor,Ind. Y1	8.40
KansasCity,Mo. S5	8.65
LosAngeles B3	9.60
Lowellville,O. S3	8.40
Newport,Ky. A2	8.40
Sharon,Pa. A2, S3	8.40
S.Chicago,Ill. W14	8.40
Youngstown U5, Y1	8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland,Ky. A10	7.575
Bessemer,Ala. T2	7.575
Conshohocken,Pa. A3	7.575
Ecorse,Mich. G5	7.575
Fairfield,Ala. T2	7.575
Farrell,Pa. S3	7.575
Gary,Ind. U5	7.575
Ind.Harbor,Ind. I-2, Y1	7.575
Lackawanna,N.Y. B2	7.575
LosAngeles(25) B3	8.325
Seattle(25) B3	8.575
Sharon,Pa. S3	7.575
S.Chicago,Ill. W14	7.575
S.SanFrancisco(25) B3	8.325
SparrowsPoint,Md. B2	7.575
Warren,O. R2	7.575
Weirton,W.Va. W6	7.575
Youngstown U5, Y1	7.575

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	5.35
Warren,O. R2	5.875

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6	7.425
Baltimore T6	7.425
Boston T6	7.975
Buffalo S40	7.425
Cleveland A7, J5	7.425
Dearborn,Mich. S3	7.425
Detroit D2, M1, P20	7.425
Dover,O. G6	7.425
Evanston,Ill. M22	7.525
Farrell,Pa. S3	7.425
Follansbee,W.Va. W10	7.425
Fontana,Calif. K1	9.20
FranklinPark,Ill. T6	7.525
Ind.Harbor,Ind. Y1	7.425
Indianapolis S41	7.575
LosAngeles C1, S41	9.30
McKeesport,Pa. E10	7.525
NewBedford,Mass. R10	7.875
NewBritain,Conn. S15	7.875
NewCastle,Pa. B4, M22	7.425
NewHaven,Conn. D2	7.875
NewKensington,Pa. A6	7.425
Pawtucket,R.I. R3, N8	7.975
Philadelphia P24	7.875
Pittsburgh J5	7.425
Riverdale,Ill. A1	7.525
Rome,N.Y.(32) R6	7.425
Sharon,Pa. S3	7.425
Trenton,N.J.(31) R5	8.875
Warren,O. R2, T5	7.425
Worcester,Mass. A7	7.975

STRIP, Cold-Rolled Alloy

Boston T6	15.90
Cleveland A7	15.55
Carnegie,Pa. S18	15.55
Dover,O. G6	15.55
Farrell,Pa. S3	15.55
FranklinPark,Ill. T6	15.55
Harrison,N.J. S18	15.55
Indianapolis S41	15.70
LosAngeles S41	17.75
Lowellville,O. S3	15.55
Pawtucket,R.I. N8	15.90
Riverdale,Ill. A1	15.55
Sharon,Pa. S3	15.55
Worcester,Mass. A7	15.85
Youngstown S41	15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7	10.80
Dearborn,Mich. S3	10.80
Dover,O. G6	10.80
Farrell,Pa. S3	10.80
Ind.Harbor,Ind. Y1	10.80
Sharon,Pa. S3	10.80
Warren,O. R2	10.80
Weirton,W.Va. W6	10.80
Youngstown Y1	10.80

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2	8.175

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Anderson,Ind. G6	9.10	....	....	....	....
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	9.05	10.10	12.60	15.60	....
Farrell,Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria,O. S1	10.05	10.40	12.60	15.60	....
FranklinPark,Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain,Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle,Pa. B4, M23	8.95	10.10	12.60	15.60	....
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington,Pa. A6	8.95	10.40	12.60	15.60	....
NewYork W3	....	10.70	12.90	16.10	19.30
Pawtucket,R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome,N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton,N.J. R5	....	10.70	12.90	15.90	18.85
Warren,O. T5	8.95	10.40	12.60	15.60	18.55
Worcester,Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)			Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	....	....	18.85	22.95	27.80
Buffalo W12	....	....	18.85	....	....
Fostoria,O. S1	....	....	19.05	22.15	....
FranklinPark,Ill. T6	....	....	19.20	23.30	28.15
Harrison,N.J. C18	....	....	18.85	22.95	27.80
NewYork W3	....	....	18.85	22.95	27.80
Palmer,Mass. W12	....	....	18.85	....	....
Trenton,N.J. R5	....	....	18.85	22.95	27.80
Worcester,Mass. A7, T6	....	....	18.85	22.95	27.80
Youngstown S41	....	....	19.20	23.30	28.15

STRIP, C.R., Electrogalvanized

Cleveland A7	7.425*
Dover,O. G6	7.425*
Evanston,Ill. M22	7.525*
McKeesport,Pa. E10	7.50*
NewCastle,Pa. M22	7.425*
Riverdale,Ill. A1	7.525*
Warren,O. B9, S3, T5	7.425*
Worcester,Mass. A7	7.975
Youngstown S41, Y1	7.425*

*Plus galvanizing extras.

STRIP, Galvanized (Continuous)

Farrell,Pa. S3	7.50
Sharon,Pa. S3	7.50

TIGHT COOPERAGE HOOP

Atlanta A11	5.825
Farrell,Pa. S3	5.525
Riverdale,Ill. A1	5.675
Sharon,Pa. S3	5.525
Youngstown U5	5.525

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$9.10	$9.35	$9.75
Fairfield,Ala. T2	9.20	9.45	9.85
Fairless,Pa. U5	9.20	9.45	9.85
Fontana,Calif. K1	9.75	10.00	10.40
Gary,Ind. U5	9.10	9.35	9.75
GraniteCity,Ill. G4	9.20	9.45	9.85
IndianaHarbor,Ind. I-2, Y1	9.10	9.35	9.75
Irvin,Pa. U5	9.10	9.35	9.75
Niles,O. R2	9.10	9.35	9.75
Pittsburg,Calif. C11	9.75	10.00	10.40
SparrowsPoint,Md. B2	9.10	9.35	9.75
Weirton,W.Va. W6	9.10	9.35	9.75
Yorkville,O. W10	9.10	9.35	9.75

ELECTROLYTIC TIN-COATED SHEET (Dollars per 100 lb)			
Aliquippa,Pa. J5 (21-27 Ga.)	....	7.90	8.10	....
IndianaHarbor,Ind. Y1 (20-27 Ga.)	....	7.90	....	....
Niles,O. R2 (20-27 Ga.)	....	7.90	8.10	8.30

TIN PLATE, Hot Dipped Common Coke	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$10.40	$10.65
Fairfield,Ala. T2	10.50	10.75
Fontana,Calif. K1	11.05	11.30
Gary,Ind U5	10.40	10.65
Irvin,Pa. U5	10.40	10.65
Pitts.,Calif. C11	11.05	11.30
Sp.Pt.,Md. B2	10.40	10.65
Weirton,W.Va. W6	10.40	10.65
Yorkville,O. W10	10.40	10.65

BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$8.20
Fairfield,Ala. T2	8.30
Fairless,Pa. U5	8.30
Fontana,Calif. K1	8.85
Gary,Ind. U5	8.20
GraniteCity,Ill. G4	8.30
Ind.Harbor,Ind. I-2, Y1	8.20
Irvin,Pa. U5	8.20
Niles,O. R2	8.20
Pittsburg,Calif. C11	8.85
SparrowsPoint,Md. B2	8.20
Weirton,W.Va. W6	8.20
Yorkville,O. W10	8.20

HOLLOWARE ENAMELING Black Plate (29 Gage)

Aliquippa,Pa. J5	7.85
Gary,Ind. U5	7.85
GraniteCity,Ill. G4	7.95
Ind.Harbor,Ind. Y1	7.85
Irvin,Pa. U5	7.85
Yorkville,O. W10	7.85

MANUFACTURING TERNES (Special Coated, Base Box)

Gary,Ind. U5	$10.05
Irvin,Pa. U5	10.05

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.) Fully Processed (Semiprocessed 1½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge,Pa. A4	....	....	12.40	13.55	14.65
GraniteCity,Ill. G4	9.975*	11.30*	12.00*	13.15*	....
IndianaHarbor,Ind. I-2	9.875*	11.20*	11.90*	13.05*	....
Mansfield,O. E6	9.875*	11.70	12.40	13.55	14.65
Newport,Ky. A2	9.875	11.70*	12.40*	13.55*	14.65*
Niles,O. M21	9.875*	11.70	12.40	13.55	....
Vandergrift,Pa. U5	9.875*	11.70	12.40	13.55	14.65
Warren,O. R2	9.875*	11.70	12.40	13.55	14.65
Zanesville,O. A10	....	11.70†	12.40	13.55	14.65

	Stator
Vandergrift,Pa. U5	8.10
Mansfield,O. E6	8.10
Warren,O. R2 (Silicon Lowcore)	8.10

SHEETS (22 Ga., coils & cut lengths) Fully Processed (Semiprocessed 1½c lower)	T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	15.70	16.30	16.80	17.85
Vandergrift,Pa. U5	15.70	16.30	16.80	17.85
Zanesville,O. A10	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	....	18.10	19.70	20.20	20.70	15.70††
Butler,Pa. A10	....	....	19.70	20.20	20.70	....
Vandergrift,Pa. U5	17.10	18.10	19.70	20.20	20.70	15.70
Warren,O. R2	....	....	....	....	....	15.70‡

*Semiprocessed. †Fully processed only. ‡Coils, annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2	8.00
Aliquippa,Pa. J5	8.00
Alton,Ill. L1	8.20
Atlanta A1	8.00
Bartonville,Ill. K4	8.10
Buffalo W12	8.00
Chicago W13	8.00
Cleveland A7, C20	8.00
Crawfordsville,Ind. M8	8.10
Donora,Pa. A7	8.00
Duluth A7	8.00
Fairfield,Ala. T2	8.00
Fostoria,O.(24) S1	8.10
Houston S5	8.25
Jacksonville,Fla. M8	8.35
Johnstown,Pa. B2	8.00
Joliet,Ill. A7	8.00
KansasCity,Mo. S5	8.25
Kokomo,Ind. C16	8.10
LosAngeles B3	8.95
Minnequa,Colo. C10	8.25
Monessen,Pa. P7, P16	8.00
Palmer,Mass. W12	8.30
Pittsburg,Calif. C11	8.95
Portsmouth,O. P12	8.00
Rankin,Pa. A7	8.00
S. Chicago,Ill. R2	8.00
S.SanFancisco C10	8.95
SparrowsPoint,Md. B2	8.10
Sterling,Ill.(1) N15	8.00
Sterling,Ill. N15	8.10
Struthers,O. Y1	8.00
Waukegan,Ill. A7	8.00
Worcester,Mass. A7	8.30

WIRE, Cold Heading Carbon

Elyria,O. W8	8.00

WIRE, Gal'd., for ACSR

Bartonville,Ill. K4	12.65
Buffalo W12	13.40
Cleveland A7	12.65
Donora,Pa. A7	12.65
Duluth A7	12.65
Johnstown,Pa. B2	13.40
KansasCity,Mo. U3	12.90
Minnequa,Colo. C10	12.775
Monessen,Pa. P7, P16	12.65
Munice,Ind. I-7	13.60
NewHaven,Conn. A7	12.95
Palmer,Mass. W12	13.70
Pittsburg,Calif. C11	13.45
Portsmouth,O. P12	12.65
Roebling, N. J. R5	12.95
SparrowsPt. Md. B2	13.50
Struthers,O. Y1	13.40
Trenton,N.J. A7	12.95
Waukegan,Ill. A7	12.65
Worcester,Mass. A7	12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5	9.75
Alton,Ill. L1	9.95
Buffalo W12	9.75
Cleveland A7	9.75
Donora,Pa. A7	9.75
Duluth A7	9.75
Johnstown,Pa. B2	9.75
KansasCity,Mo. S5, U3	10.00
Kokomo,Ind. C16	9.85
LosAngeles B3	10.70
Minnequa,Colo. C10	9.95
Monessen,Pa. P7, P16	9.75
NewHaven,Conn. A7	10.05
Palmer,Mass. W12	10.05
Pittsburg,Calif. C11	10.70
Portsmouth,O. P12	9.75
Roebling,N.J. R5	10.05
S.Chicago,Ill. R2	9.75
S.SanFrancisco C10	10.70
SparrowsPt.,Md. B2	9.85
Struthers,O. Y1	9.75
Trenton,N.J. A7	10.05
Waukegan,Ill. A7	9.75
Wor'ster,Mass.A7,J4,T6	10.05

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5	9.75
Alton,Ill. L1	9.95
Bartonville,Ill. K4	9.85
Buffalo W12	9.75
Cleveland A7	9.75
Donora,Pa. A7	9.75
Duluth A7	9.75
Fostoria,O. S1	9.80
Johnstown,Pa. B2	9.75
KansasCity,Mo. S5, U3	10.00
LosAngeles B3	10.70
Millbury,Mass.(12) N6	10.05
Minnequa,Colo. C10	9.95
Monessen,Pa. P7, P16	9.75
Munice,Ind. I-7	9.95
Palmer,Mass. W12	10.05
Pittsburg,Calif. C11	10.70
Portsmouth,O. P12	9.75
Roebling,N.J. R5	10.05
S.Chicago,Ill. R2	9.75
S.SanFrancisco C10	10.70
SparrowsPt.,Md. B2	9.85
Struthers,O. Y1	9.75
Trenton,N.J. A7	10.05
Waukegan,Ill. A7	9.75
Worcester,Mass. A7,J4,T6	10.05

WIRE, Fine & Weaving(8" Coils)

Alton,Ill. L1	16.50
Bartonville,Ill. K4	16.40
Chicago W13	16.30
Cleveland A7	16.30
Crawfordsville,Ind. M8	16.40
Fostoria,O. S1	16.30
Houston S5	16.55
Jacksonville,Fla. M8	16.65
Johnstown,Pa. B2	16.30
KansasCity,Mo. S5	16.55
Kokomo,Ind. C16	16.30
Minnequa,Colo. C16	16.55
Monessen,Pa. P16	16.30
Muncie,Ind. I-7	16.50
Palmer,Mass. W12	16.60
S.SanFrancisco C10	17.15
Waukegan,Ill. A7	16.30
Worcester,Mass. A7, J6	16.60

ROPE WIRE (A)

Bartonville,Ill. K4	13.45
Buffalo W12	13.45
Fostoria,O. S1	13.45
Johnstown,Pa. B2	13.45
Monessen,Pa. P7	13.45
Muncie,Ind. I-7	13.65
Palmer,Mass. W12	13.75
Portsmouth,O. P12	13.45
Roebling,N.J. R5	13.75
St.Louis L8	13.45
SparrowsPt.,Md. B2	13.55
Struthers,O. Y1	13.45
Worcester,Mass. J4	13.75

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE, Tire Bead

Bartonville,Ill. K4	17.15
Monessen,Pa. P16	17.15
Roebling,N.J. R5	17.65

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville,Ind. M8	12.35
Dover,O. G6	12.35
Farrell,Pa. S3	12.35
Fostoria,O. S1	12.35
FranklinPark,Ill. T6	12.45
Kokomo,Ind. C16	12.35
Massillon,O. R8	12.35
Milwaukee C23	12.55
Monessen,Pa. P7, P16	12.35
Palmer,Mass. W12	12.65
Pawtucket,R.I. N8	12.65
Philadelphia P24	12.65
Riverdale,Ill. A1	12.45
Rome,N.Y. R6	12.35
Sharon,Pa. S3	12.35
Trenton,N.J. R5	12.65
Warren,O. B9	12.35
Worcester,Mass. A7,T6	12.65

NAILS, Stock Sizes — Col.

AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	173
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

(To Wholesalers: per cwt)

Galveston,Tex. D7	$10.30

NAILS, CUT (100 lb kegs)

Wheeling,W.Va., W10	$10.10

POLISHED STAPLES — Col.

AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	175
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	178
Pittsburg,Calif. C11	194
Rankin,Pa. A7	173
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	177
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

TIE WIRE, Automatic Baler (14½ Ga.) (per 97 lb Net Box) Coil No. 3150

AlabamaCity,Ala. R2	$8.78
Atlanta A11	10.36
Bartonville,Ill. K4	8.88
Buffalo W12	10.26
Chicago W13	9.24
Crawfordsville,Ind. M8	8.88
Donora,Pa. A7	8.78
Duluth A7	8.78
Fairfield,Ala. T2	8.78
Houston S5	10.51
Jacksonville,Fla. M8	8.88
Johnstown,Pa. B2	8.78
Joliet,Ill. A7	8.78
KansasCity,Mo. S5	10.51
Kokomo,Ind. C16	8.88
LosAngeles B3	9.44
Minnequa,Colo. C10	9.02
Pittsburg,Calif. C11	9.44
S.Chicago,Ill. R2	8.78
S.SanFrancisco C10	9.94
SparrowsPt.,Md. B2	8.88
Sterling,Ill.(37) N15	8.88

Coil No. 6500 Stand.

AlabamaCity,Ala. R2	$9.06
Atlanta A11	10.70
Bartonville,Ill. K4	9.16
Buffalo W12	10.60
Chicago W13	9.54
Crawfordsville,Ind. M8	9.16
Donora,Pa. A7	9.06
Duluth A7	9.06
Fairfield,Ala. T2	9.06
Houston S5	10.85
Jacksonville,Fla. M8	9.16
Johnstown,Pa. B2	9.06
Joliet,Ill. A7	9.06
KansasCity,Mo. S5	10.85
Kokomo,Ind. C16	9.16
LosAngeles B3	9.75
Minnequa,Colo. C10	9.30
Pittsburg,Calif. C11	9.75
S.Chicago,Ill. R2	9.06
S.SanFrancisco C10	10.26
SparrowsPt.,Md. B2	9.16
Sterling,Ill.(37) N15	9.16

Coil No. 6500 Interim

AlabamaCity,Ala. R2	$9.11
Atlanta A11	10.75
Bartonville,Ill. K4	9.21
Buffalo W12	10.65
Chicago W13	9.59
Crawfordsville,Ind. M8	9.21
Donora,Pa. A7	9.11
Duluth A7	9.11
Fairfield,Ala. T2	9.11
Houston S5	10.90
Jacksonville,Fla. M8	9.21
Johnstown,Pa. B2	9.11
Joliet,Ill. A7	9.11
KansasCity,Mo. S5	10.96
Kokomo,Ind. C16	9.21
LosAngeles B3	9.80
Minnequa,Colo. C10	9.35
Pittsburg,Calif. C11	9.80
S.Chicago,Ill. R2	9.11
S.SanFrancisco C10	10.31
SparrowsPt.,Md. B2	9.21
Sterling,Ill.(37) N15	9.21

BALE TIES, Single Loop — Col.

AlabamaCity,Ala. R2	212
Atlanta A11	212
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
S.SanFrancisco C10	236
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214

FENCE POSTS — Col.

Birmingham C15	177
ChicagoHts.,Ill. C2, I-2.	177
Duluth A7	177
Franklin,Pa. F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	177

WIRE, Barbed — Col.

AlabamaCity,Ala. R2	.193**
Aliquippa,Pa. J5	190§
Atlanta A11	197*
Bartonville,Ill. K4	199
Crawfordsville,Ind. M8	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala. T2	193†
Houston S5	198**
Jacksonville,Fla. M8	198
Johnstown,Pa. B2	196§
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	198**
Monessen,Pa. P7	196§
Pittsburg,Calif. C11	213†
Rankin,Pa. A7	193†
S.Chicago,Ill. R2	193**
S.SanFrancisco C10	213*
SparrowsPoint,Md. B2	198§
Sterling,Ill.(7) N15	198

WOVEN FENCE, 9-15 Ga. — Col.

Ala.City,Ala. R2	187**
Aliq'ppa,Pa.9-11½ga.J5	190§
Atlanta A11	191*
Bartonville,Ill. K4	193
Crawfordsville,Ind. M8	192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192**
Jacksonville,Fla. M8	192
Johnstown,Pa.(43) B2	190§
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
Rankin,Pa. A7	187†
S.Chicago,Ill. R2	187**
Sterling,Ill.(7) N15	192

WIRE (16 gage) — An'ld Galv. Stone — Stone

Ala.City,Ala.R2	17.85	19.40**
Aliq'ppa,Pa. J5	17.85	19.65
Bartonville K4	17.95	19.80
Cleveland A7	17.85	....
Craw'dville M8	17.95	19.80‡‡
Fostoria,O. S1	18.35	19.90†
Houston S5	18.10	19.65**
Jacksonville M8	18.95	19.80‡‡
Johnstown B2	17.85	19.65§
Kan.City,Mo. S5	18.10	....
Kokomo C16	17.95	19.50‡
Minnequa C10	18.10	19.65**
P'lm'r,Mass. W12	18.15	19.70†
Pitts.,Calif. C11	18.20	19.75†
S.SanFran. C10	18.20	19.75**
St'ling(37) N15	17.95	19.80
SparrowsPt. B2	17.95	19.75§
Waukegan A7	17.85	19.40†
Worcester A7	18.15	....

WIRE, Merchant Quality (6 to 8 gage) — An'ld Galv.

Ala.City,Ala. R2	9.00	9.55**
Aliquippa J5	8.65	9.325§
Atlanta(48) A11	9.00	9.75*
Bartonville(48) K4	9.85	19.90
Buffalo W12	9.00	9.55†
Cleveland A7	9.00	....
Crawfordsville M8	9.10	9.80††
Donora,Pa. A7	9.00	9.55†
Duluth A7	9.00	9.55†
Fairfield T2	9.00	9.55†
Houston(48) S5	9.25	9.80**
Jack'ville,Fla. M8	9.10	9.80††
Johnstown(48) B2	9.00	9.675§
Joliet,Ill. A7	9.00	9.55†
KansasCity(48) S5	9.25	9.80**
Kokomo(48) S16	9.10	9.65†
LosAngeles B3	9.95	10.625§
Minnequa C10	9.25	9.80**
Monessen(48) P7	8.65	9.35§
Palmer,Mass. W12	9.30	9.85†
Pitts.,Calif. C11	9.95	10.50†
Rankin,Pa. A7	9.00	9.55†
S.Chicago R2	9.00	9.55**
S.SanFran. C10	9.95	10.50**
Spar'wsPt.(48) B2	9.10	9.775§
St'ling(37)(48) N15	9.10	9.80
Struthers,O. Y1	9.00	9.65‡
Worcester,Mass. A7	9.30	9.85†

Based on zinc prices of: *13.50c. †5c. §10c. ‡Less than 10c. ††10.50c. ‡‡11.00c. **Subject to zinc equalization extras.

FASTENERS

(Consumer discounts per cent off list prices, orders for 1 container for assorted sizes; for less than container quantities, add 25 per cent; attaching nuts to bolts, package sizes, add 7.5 per cent; heavy hex nut 1¼ in. through 1½ in. tapped 8 threads, add 10 per cent)

HEX HEAD CAP SCREWS, coarse, or fine thread, packaged or bulk, with or without hex nuts. 1020 steel bright and high carbon heat treated, ¼ in. thru 1 in. diam., listed lengths:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
Bulk	50

BOLTS, Standard stock sizes:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
*Bulk	50

*Hot galvanized or zinc plated lag bolts only — for package or bulk quantities use applicable list less bulk discounts.

HEXAGON NUTS, American Standard: Finished hex, hex jam, and hex slotted coarse or fine thread, ¼ in. through 3 in., finished hex thick, thick and slotted, castle, fine thread, ¼ in. through 1½ in., semifinished hex heavy, heavy and jam, heavy and slotted, coarse thread, ¼ in. through 4 in., and

SQUARE NUTS, American Standard: Regular square and heavy square, coarse thread, ¼ in. through 2 in.:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packages	43.75
Bulk	50

CAP AND SETSCREWS,

Fillister Head, Cap Screws, Coarse Thread:

Packages	+55
Bulk	+16

Flat Head Cap Screws: ¾ in. and smaller, 6 in. and shorter:

Packages	+85
Bulk	+38

Setscrews, Square Head, Cup Point, Coarse Thread: Through 1 in. diam., 6 in. and shorter:

Packages	+ 5
Bulk	19

Through 1 in. diam., longer than 6 in.:

Packages	+29

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ½ in., larger 12.85

⅞ in. and smaller by 6 in. and shorter: 15% off list.

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over)

	Standard Diameter, Inches				
	1/4	5/16	3/8	7/16	1/2
Buffalo W12	$26.20	$38.50	$47.90	$61.30	$80.30
KansasCity,Mo. U3	26.20	38.50	47.90	61.30	80.30
Minnequa,Colo. C10	26.20	38.50	47.90	61.30	80.30
Pittsburg,Calif. C11	26.20	38.50	47.90	61.30	80.30
Roebling,N.J. R5	26.20	38.50	47.90	61.30	80.30
SparrowsPoint,Md. B2	26.20	38.50	47.90	61.30	80.30
St.Louis L8	26.20	38.50	47.90	61.30	80.30
Waukegan,Ill. A7	26.20	38.50	47.90	61.30	80.30

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut length 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.13
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	53.17	40.26
2¼	12	49.24	57.72	43.70
2½	12	54.23	63.57	48.13
2¾	12	58.73	68.83	52.13
3	12	62.62	73.40	55.59

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.65	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....(16)	6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.225
Steelton,Pa. B2	5.75	5.65	....	....
Williamsport,Pa. S19	....	....	....	6.725

TIE PLATES

Fairfield,Ala. T2	6.875
Gary,Ind. U5	6.875
Lackawanna,N.Y. B2	6.875
Minnequa,Colo. C10	6.875
Seattle B3	7.025
Steelton,Pa. B2	6.875
Torrance,Calif. C11	7.025

JOINT BARS

Bessemer,Pa. U5	7.25
Fairfield,Ala. T2	7.25
Joliet,Ill. U5	7.25
Lackawanna,N.Y. B2	7.25
Minnequa,Colo. C10	7.25
Steelton,Pa. B2	7.25

AXLES

Ind.Harbor,Ind. S13	9.125
Johnstown,Pa. B2	9.125

SCREW SPIKES

Lebanon,Pa. B2	15.10

TRACK BOLTS, Untreated

Cleveland R2	15.35
KansasCity,Mo. S5	15.35
Lebanon,Pa. B2	15.35
Minnequa,Colo. C10	15.35
Pittsburgh S44	15.35
Seattle B3	15.85

STANDARD TRACK SPIKES

Fairfield,Ala T2	10.10
Ind.Harbor,Ind. I-2, Y1	10.10
KansasCity,Mo. S5	10.10
Lebanon,Pa. B2	10.10
Minnequa,Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S.Chicago,Ill. R2	10.10
Struthers,O. Y1	10.10
Youngstown R2	10.10

Footnotes

(1) Chicago base.
(3) Merchant.
(4) Reinforcing.
(5) 1¼ to under 1 7/16 in.: 1 7/16 to under 1 15/16 in.: 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(12) Worcester, Mass., base.
(15) ⅝" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(26) Deld. in mill zone, 5.40c.
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter; 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds, 9.65c, over 3½ in. and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	1.5	+27	+10.5	+36	+21	+45.5	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.75		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 13.00c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	....	43.50	39.25	48.50	45.00
202	24.75	28.25	37.75	30.00	42.25	44.50	40.00	49.25	49.25
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	47.50
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	52.00
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	31.25	42.00	43.75	47.00	49.50	45.75	56.00	55.00
304L	....	....	49.75	51.50	54.75	57.25	53.50	62.75	62.75
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.25	75.75	71.75	80.75	80.75
316L	....	....	72.25	76.25	79.50	83.50	79.50	88.50	88.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.00	65.50
330	....	....	123.25	....	113.00	143.75	135.00	149.25	149.25
18-8 CbTa	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	79.25
403	....	....	29.25	....	33.25	35.00	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	29.25	31.00	33.25	35.00	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	40.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	51.75
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Specialty Wire Co. Inc.; Standard Tube Co., Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steel Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Steel Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates: Carbon Base 5%	10%	15%	20%	Sheets: Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	49.80	61.35	72.80	84.40	....
Nickel	43.20	55.05	66.95	78.90	....
Nickel, Low Carbon	43.50	55.70	67.95	80.35	....
Monel	44.25	55.35	66.45	77.60	....

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	36.80	44.20

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22; Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	Hi-Carbon-Cr (D-11)	0.955
Spec. Carbon (W-1)	0.385	V-Cr Hot Work (H-13)	0.550
Oil Hardening (O-1)	0.505	W-Cr Hot Work (H-12)	0.530
V-Cr Hot Work (H-11)	0.505	W Hot Wk (H-21)	1.425-1.44

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	....	T-1	1.840
18	4	2	....	....	T-2	2.005
13.5	4	3	....	....	T-3	2.105
18.25	4.25	1	4.75	....	T-4	2.545
18	4	2	9	....	T-5	2.915
20.25	4.25	1.6	12.95	....	T-6	4.330
13.75	3.75	2	5	....	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C12, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

Prices in dollars per gross ton, f.o.b. (rail) furnace; add 50 cents when shipped by truck. Minimum delivered prices are approximate and based on rail shipment.

	Basic	No. 2 Foundry	Malle-able	Besse-mer
Birmingham District				
Birmingham R2	62.00	62.50**	....	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N. Tonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester, N.Y., deld.	69.02	69.52	70.02	....
Syracuse, N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S. Chicago R2	66.00	66.50	66.50	67.00
S. Chicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	69.02	69.52	69.52	70.02
Muskegon, Mich., deld.	....	74.52	74.52	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
New York, deld.	....	75.50	76.00	....
Newark, N.J., deld.	72.69	73.19	73.69	74.19
Philadelphia, deld.	70.41	70.91	71.41	71.99
Troy, N.Y. R2	68.00	68.50	69.00	69.50
Boston, deld.	75.20	75.70	76.20	76.70
Pittsburgh District				
Neville Island, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), Aliquippa, deld.	....	67.95	67.95	68.43
McKees Rocks, Pa., deld.	....	67.60	67.60	68.13
Lawrenceville, Homestead, Wilmerding, Monaca, Pa., deld.	....	68.26	68.26	69.79
Verona, Trafford, Pa., deld.	68.29	68.82	68.82	69.35
Brackenridge, Pa., deld.	68.60	69.10	69.10	69.63
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....
Mansfield, Ohio, deld.	71.30	....	71.80	72.30
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
Granite City, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	62.00	62.50‡	66.50	67.00
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....

*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 11.50%; starting with silicon over 11.50% add $1.50 per ton for each 0.50% silicon or portion thereof up to 14%; add $1 for each 0.50% Mn over 1%)

Jackson, Ohio I-3, J1	$78.00
Buffalo H1	79.25

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

Calvert City, Ky. P15	$99.00
Niagara Falls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry, K2	89.00
Keokuk, Iowa O.H. & Fdry, 12½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Birdsboro, Pa. B10 (Phos. 0.075% max)	$73.00
Lyles, Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Erie, Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Neville Island, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Swedeland, Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	73.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb items (except stainless) ordered by themselves. Prices will vary with total weight of the order or weight of the individual items or both. Base quantities for stainless sheets: 8000 lb, except in Chicago, New York, Boston, Los Angeles, and San Francisco, 10,000 lb. City delivery charges are 15 cents per 100 lb except; Denver, 20 cents; Baltimore, Boston, New York, Philadelphia, San Francisco, 10 cents; Atlanta, Birmingham, Dallas, Houston, Los Angeles, Seattle, no change.

	SHEETS				STRIP	BARS			STRUCTURAL	PLATES	
	Hot Rolled	Cold Rolled	Galv.	Stainless Type 302	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	SHAPES	Carbon	Floor
Atlanta	9.37	10.61	11.83	....	10.85	9.53	13.24	....	9.94	9.73	11.16
Baltimore	8.27	8.66	10.06	....	8.28	8.95	11.80	16.38	9.53	8.84	10.43
Birmingham	9.43	10.20	10.46	....	10.41	8.26	13.14	16.76	8.47	8.41	10.05
Boston	9.67	10.58	11.77	53.50	12.16	9.77	13.35	16.59	10.16	9.62	11.08
Buffalo	8.80	9.95	11.15	55.98	10.65	9.00	11.45	16.30	9.65	9.00	10.85
Charlotte, N. C.	9.87	11.22	10.30	....	10.86	9.67	12.68	....	9.88	9.82	11.46
Chicago	8.57	10.20	10.15	52.00	10.74	8.55	10.65	15.95	8.91	8.41	10.68
Cincinnati	8.74	10.26	10.20	65.30	11.06	8.87	11.53	16.27	9.47	8.79	11.01
Cleveland	8.57	9.98	11.24	56.18	10.86	8.66	11.25	16.06	9.30	8.65	10.92
Dallas	9.62	10.43	12.59	....	11.18	9.03	12.98	16.95	9.26	9.35	11.00
Detroit	8.83	10.46	10.50	52.00	11.11	8.86	11.01	16.23	9.47	8.78	10.94
Denver	9.41	11.77	12.11	....	9.86	10.10	11.47	....	10.02	9.69	11.83
Houston	9.22	10.03	12.19	52.00	10.78	8.63	13.10	16.55	8.86	8.95	10.60
Indianapolis	9.01	10.64	10.59	....	11.18	8.99	11.09	16.39	9.35	8.85	11.12
Kansas City	9.21	10.87	11.35	....	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	9.59	11.29	12.20	61.27	11.29	9.67	14.20	17.35	10.54	9.82	11.79
Memphis, Tenn.	9.84	10.05	....	....	11.24	9.92	12.74	....	10.33	10.12	11.41
Milwaukee	8.71	10.34	10.29	....	10.88	8.69	10.89	16.09	9.13	8.55	10.82
Moline, Ill.	9.24	10.70	11.45	....	10.90	9.34	11.15	16.45	9.83	9.17	10.96
Newark, N. J.	9.36	10.13	11.35	....	11.46	9.74	13.25	16.40	10.20	9.51	11.05
New York	9.36	10.13	11.35	52.98	11.46	9.74	13.25	16.40	10.20	9.51	11.05
Philadelphia	8.85	10.00	10.89	52.71	10.85	9.25	11.95	16.38	9.45	9.20	10.45
Pittsburgh	8.57	9.98	11.13	52.00	10.84	8.55	11.25	15.95	8.91	8.41	10.68
Portland, Oreg.	10.20	12.05	12.35	....	12.20	10.20	16.65	17.80	10.80	10.35	12.50
St. Louis	8.77	10.58	10.53	....	10.94	8.77	11.28	16.33	9.14	8.62	10.91
St. Paul	8.84	9.59	10.84	....	11.01	8.82	11.49	16.54	9.18	8.68	10.44
San Francisco	10.17	11.69	11.45	54.00	11.78	10.07	15.10	17.25	10.49	10.33	12.47
Seattle	10.51	11.57	12.50	54.02	11.95	9.94	16.20	17.80	10.65	10.19	12.73
Spokane, Wash.	10.36	11.42	12.35	54.02	11.80	9.79	16.20	17.80	10.50	9.95	12.58

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 x 96-120 in.; cold rolled sheets, 20 Ga. & 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Dallas and Houston, 10 Ga. x 48 x 120 in.; stainless, 16 Ga. x 36 in.; hot rolled strip, ⅛ in. x 1 in.; hot rolled carbon bars, rounds, ⅜ in.—1¼ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1⅝ in.—2⅜ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plates, sheared, through ½ in. x 84 in.; floor plates, ¼ in. x 36 in.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., $140; Salina, Pa., $145; Niles, Ohio, $138; Cutler, Utah, $175.

Super-Duty: Ironton, Ohio, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Md., St. Louis, $185; Stevens Pottery, Ga., $195; Cutler, Utah, $248.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, Ohio, Hawstone, Pa., St. Louis, $158; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $163; E. Chicago, Ind., Joliet, Rockdale, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Super-Duty: Sproul, Hawstone, Pa., Niles, Warren, Windham, Ohio, Leslie, Md., Athens, Tex., $158; Morrisville, Hays, Latrobe, Pa., $163; E. Chicago, Ind., St. Louis, $168; Canon City, Colo., $183; Curtner, Calif., $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $140; Philadelphia, Clearfield, Pa., $145.

Ladle Brick (per 1000 pieces*)

Dry-Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Vanport, Pa., Mexico, Vandalia, Mo., Wellsville, Irondale, New Salisbury, Ohio, $96.75; Clearfield, Pa., Portsmouth, Ohio, $102.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., Danville, Ill., $253; Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., $260.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., $320; Philadelphia, $325.

70 *Per cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., $360; Philadelphia, $365.

Sleeves (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $234.

Dolomite (per net ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Narlo, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Bonne Terre, Mo., $15.00.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines: Chewelah, Wash., Luning, Nev., $46; ⅜ in. grains with fines: Baltimore, $73.

*—9 in. x 4½ x 2.50 straights.

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60%, $33-$36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade; European, $30-$33, contract; Mexican, all rail, duty paid, $28-$28.50; barge, Brownsville, Tex., $30-$31.

Ores

Lake Superior Iron Ore

(Prices effective for the 1960 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer	$11.60
Mesabi nonbessemer	11.45
Old Range bessemer	11.85
Old Range nonbessemer	11.70
Open-hearth lump	12.70
High phos.	11.45

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1960, and increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

New Jersey, concentrates	nom.

Foreign Iron Ore

Cents per unit

Swedish basic, 65%, c.i.f. Atlantic ports	23.00†
Chilean, 62-65%, c.i.f. Atlantic ports	22.00
Brazilian, 68.5%, f.o.b. vessel, Victoria, per ton	$11.50

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	$19.75-20.00
Domestic, concentrates, f.o.b. milling points	22.00-23.00

*Before duty. †Nominal.

Manganese Ore

Mn 46-58%, Indian, 85-90c, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian	
48% 3:1	$34.00-35.00†
48% no ratio	25.00-26.00†
South African Transvaal	
44% no ratio	18.75†
48% no ratio	24.00-26.00†
Turkish	
48% 3:1	36.00-37.00†
Domestic	
Rail nearest seller	
18% 3:1	30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked	$1.23

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard	
55-60%	$2.50-2.80
60-65%	2.80-3.20

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

†Nominal.

Canadian Steel

(Cents per pound, f.o.b. mill, except as otherwise noted)

Billets, Blooms & Slabs:	
Carbon, Forging Quality (net ton)	$97.00
Alloy (net ton)	115.00
Wire Rods:	
Carbon ⅜" to under ¼ in.	5.30
Carbon, ¼ in. to 47/64 in.	5.70
Alloy	6.40
Wire (Carload lots)	8.40
Bars & Small Shapes:	
Carbon, merchant quality	5.40
Carbon, special quality	5.85
Alloy	6.40
Bar Mill Bands:	
Carbon	5.40
Alloy	8.05
Structural Size Angles & Zees	5.40
Plates:	
Carbon	5.45
Sheets & Coils, Hot Rolled:	
Carbon Sheets	5.00
Carbon Strip	5.00
Sheets & Coils, Cold Rolled:	
Carbon Sheets	6.35
Carbon Strip (0.080 and lighter)	6.35
Carbon Strip (0.081 and heavier)	6.65
Sheets & Coils, Galvanized:	
Standard Quality	6.70
Culvert Quality	7.00
Sheets, Porcelain Enameling	7.45
Sheets & Coils, Electrical:	
Field Grade	9.00
Armature Grade	9.50
Electrical Grade	10.15
Tin Mill (Per Base Box; **Products** 100 lb basis wt)	
Coke Tin Plate (1.25 lb pot yield)	$10.60
Electrolytic Tin Plate (0.25 lb coating)	9.10
Black Plate	8.30
Nails, c.l. lots (per keg)	
400 keg min.	$8.15

Metal Powder

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as noted)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. trucklots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85‡
40 mesh, bags	8.10††
Electrolytic Iron,	
Melting stock, 99.9% Fe, irreg. fragments, ⅛ in. x 1.3 in.	28.75
(In contract lots of 750 tons price is 22.75c)	
Annealed, 99.5% Fe, 36.75 ton, del. east of Mississippi.	
Unannealed (99+% Fe)	33.0
Unannealed (99+% Fe) (minus 325 mesh)	58.0
Carbonyl Iron: 90-99.9%, 3 to 20 microns, depending on grade, 88.00-700.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum: Atomized, 600-lb drum freight allowed, c.l. 39.80; ton lots 41.80	
Brass, 80/20, leaded (60 mesh)	39.90
Bronze, filter powder, 90/10	47.00*
Copper, all types	15.25*
Lead	7.50*
Manganese, minus 35 mesh	$1.00
Nickel	$0.95-$1.15
Nickel-Silver	*60.70*
Solder	15.00*
Stainless Steel, 304	89.00
Stainless Steel, 316	$1.07
Steel, AISI 4650	32.00
Tin	14.00*
Zinc	25.90
Tungsten: Carbon and hydrogen reduced, 98.8% min., minus 65 mesh	Dollars nom.**
Molybdenum	4.35

*Plus cost of metal. ‡Depending on mesh. §Cutting and scarfing grades. **Depending on price of ore. ††Welding grade.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa., furnace	$14.75-15.25
Connellsville, Pa., foundry	18.00-18.50

Oven Foundry

Birmingham, ovens	$30.35
Cincinnati, deld.	33.34
Buffalo, ovens	32.00
Chattanooga, Tenn., ovens	30.80
Detroit, ovens	32.00
Pontiac, Mich., deld.	33.95
Saginaw, Mich., deld.	35.53
Erie, Pa., ovens	32.00
Everett, Mass., ovens: New England, deld.	33.55*
Indianapolis, ovens	31.25
Ironton, Ohio, ovens	30.50
Cincinnati, deld.	33.54
Kearny, N. J., ovens	31.25
Milwaukee, ovens	32.00
Neville Island (Pittsburgh), Pa., ovens	30.75
Painesville, Ohio, ovens	32.00
Cleveland, deld.	34.19
Philadelphia, ovens	31.00
St. Louis, ovens	33.00
St. Paul, ovens	31.25
Chicago, deld.	34.68
Swedeland, Pa., ovens	31.00
Terre Haute, Ind., ovens	31.25

*Within $5.15 freight zone from works.

Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe)

	North Atlantic	Great Lakes	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	*$5.65*	*$5.55*	*$5.55*	*$5.40*	*$5.75*
Bar Size Angles	5.85	5.75	5.75	5.60	5.95
Structural Angles	5.65	5.55	5.55	5.40	5.75
I-Beams	5.60	5.50	5.50	5.35	5.70
Channels	5.60	5.50	5.50	5.35	5.70
Plates (basic bessemer)	*5.85*	*5.75*	*'5.75*	*5.60*	*5.95*
Sheets, H.R.	Nom.	Nom.	Nom.	Nom.	Nom.
Sheets, Galvanized, 20 Ga., 36 in. x 96 in.	Nom.	Nom.	Nom.	Nom.	Nom.
Sheets, Galv. (in coils) 20 Ga., 48 in. wide	Nom.	Nom.	Nom.	Nom.	Nom.
Furring Channels, C.R., 1000 ft, ⅞ x 0.30 lb per ft	25.70	25.14	24.85	24.85	26.02
Barbed Wire (†)	*6.15*	*6.05*	*6.05*	*5.90*	*6.25*
Merchant Bars	5.85	5.75	5.75	5.60	5.95
Hot-Rolled Bands	6.20	6.10	6.10	5.95	6.30
Wire Rods, Thomas Commercial No. 5	6.40	6.35	6.20	6.20	6.60
Wire Rods, O. H., No. 5	6.55	6.50	6.35	6.35	6.70
Bright Common Wire Nails (§)	*7.30*	*7.20*	*7.20*	*7.05*	*7.40*

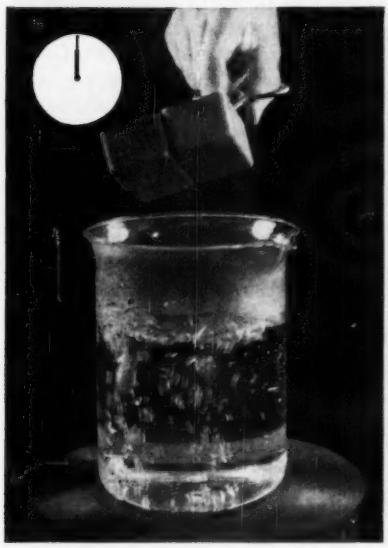
†Per 82 lb net reel. §Per 100-lb keg, 20d nails and heavier.

Coal Chemicals

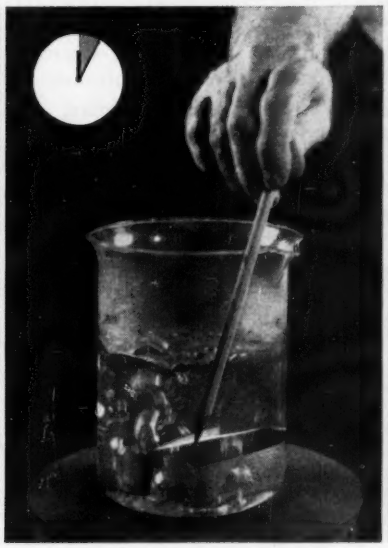
(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.	
Pure benzene	31.00
Xylene, industrial grade	29.00
Creosote	24.00
Naphthalene, 78 deg.	6.00
Toluene, one deg. (deld. east of Rockies)	25.00
Cents per lb, f.o.b. tank cars or tank trucks, deld.	
Phenol, 90 per cent grade	14.75
Per net ton bulk, f.o.b. cars or trucks, plant.	
Ammonium sulfate, regular grade	$32.00

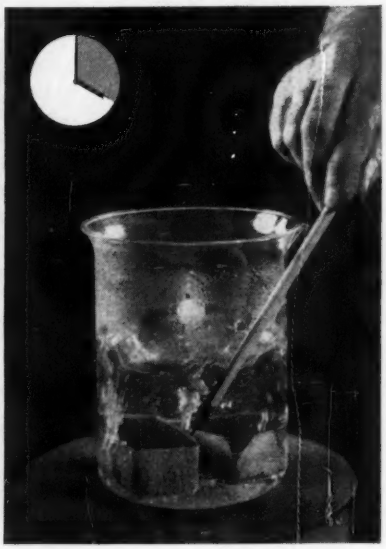
A DRAMATIC DEMONSTRATION OF THE NEW CLAD-REX 102 LAMINATE



Boiling water provides a positive test for two deep drawn* vinyl-clad parts. Neither special care in forming, nor post curing has been used to prepare either part.



Almost within a matter of seconds, the part formed of conventional vinyl-clad metal (at right) begins delaminating at the corners.



Even after as long as four hours of boiling, the part formed of new Clad-Rex 102 laminate (at left) still shows no delamination whatsoever.

New Clad-Rex vinyl-clad metal sharply reduces limitations in deep drawing and heat exposure

Has your interest in vinyl-clad metals been cooled because your product is deep drawn? . . . or because your product is exposed to elevated temperatures? . . .

Now, you can solve the problem with new Clad-Rex 102. It's a new vinyl-metal laminate that is, in effect, a single element of material. Clad-Rex 102 combines *for the first time* the ultimate properties of sheet metal with the optimum characteristics of vinyl.

Call or write for facts of this major technological breakthrough by the extensive research laboratories of Simoniz Company.

*Depth of draw equal to six times radius of corner

VINYL-METAL LAMINATES BY **CLAD-REX**® DIVISION OF SIMONIZ COMPANY

11504 W. King Street • Franklin Park, Illinois

Telephone: GLadstone 1-2323

ZZC

(*Concluded from Page* 108)

public reception of the 1961 model cars.

Hot rolled sheet deliveries can be had in ten days to three weeks where bands are available. Cold rolled shipments run two to four weeks. By comparison, galvanized sheet shipments are well extended, averaging around five weeks. However, new galvanized business is disappointing. Demand should be at peak now, but instead orders are declining. The weakness is attributed to lack of a grain bin program, and failure of the auto industry to follow through on plans for more extensive use of galvanized material.

Specialties, such as enameling stock and electrical sheets, are available for shipment within three to four weeks.

Rails, Cars . . .

Track Material Prices, Page 113

The Canadian National Railways has placed an order with the Eastern Car Co., Trenton, Nova Scotia, for 80 steel flatcars. The units will be delivered early in December, and will be used in Newfoundland service.

The Minneapolis, St. Paul & Sault Ste. Marie Railroad has ordered five, 85 ft piggyback flatcars, designed to carry highway trailers, from the Pullman-Standard Div., Pullman Inc., Chicago. Each car will carry two, 40 ft trailers.

Tool Steel . . .

Tool Steel Prices, Page 114

Net shipments of tool steels, excluding hollow drill steel, declined to 7332 net tons in June from 7610 tons in May, reports the American Iron & Steel Institute. (The totals exclude shipments to members of the industry for conversion into further finished products or for resale, amounting to 363 tons in June and 404 tons in May.)

Total net shipments for the first six months came to 53,249 tons compared with 54,936 tons for the like period a year ago.

Wire . . .

Wire Prices, Pages 112 & 113

After hitting the low point for the year in July, demand for manufacturers' wire is picking up seasonally. One important producer forecasts a 25 per cent increase in bookings this month, and a further gain of 20 per cent in September.

While demand is firming up, order backlogs are not growing appreciably. Wiremakers can still take orders for August shipment in some items.

Auto builders are ordering for September and October delivery, but they appear uncertain about their production schedules. They are evidently wondering how high compact car sales will go.

Tubular Goods . . .

Tubular Goods Prices, Page 114

Oil country goods producers are confident that August will be a better month than July from a shipping standpoint, but only because last month's shipments were curtailed by vacation shutdowns. There has been no improvement in demand. Users are demanding deliveries for immediate needs only.

To compete in today's tight market, producers have upped their finished steel inventories to the 1958 level, and are shipping a higher than normal proportion of their tonnage by rail.

One sales official explains: "Our policy is to meet competition when it's commercially desirable, and today we're finding more cases when it's desirable than we normally would."

Meeting competition often involves shipping by rail and absorbing the difference between barge and rail rates.

Rotary drilling of oil wells in the U. S. and Canada totaled 1912 rigs in the latest tally by Hughes Tool Co. There were 1728 operating rigs in the U. S. and 184 in Canada, an increase for the week of 29 for the U. S. and three for Canada.

Structural Shapes . . .

Structural Shape Prices, Page 110

Despite the lateness of the building season, a slight spurt in structural steel demand is noted. Orders are spotty, but more jobs are being figured, with public work, notably bridges, dominating.

Early steel deliveries are sought because of the advancing building season. Some structural shops can make surprisingly quick shipments —10 to 12 weeks is not uncommon. In some cases, shipments can be made in four to five weeks. Generally, though, fabricators say they can't provide much tonnage under three months.

While construction has required a considerable amount of steel this summer, volume has been below expectations. One reason: Reduced activity at manufacturing plants, which resulted in the shelving or deferral of expansion and remodeling plans.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

5000 tons, assembly plant, Mack Truck Co., Hagerstown, Md., to Lehigh Structural Steel Co., Allentown, Pa.

950 tons, Westinghouse Vocational High School, Brooklyn, N. Y., to Dreier Structural Steel Co. Inc., Long Island City, N. Y.

600 tons, Central Dauphin East High School, Lower Paxton Township, near Harrisburg, Pa., to Goetzle Welding Co., Harrisburg.

560 tons, laboratory, Geigy Chemical Corp., Ardsley, N. Y., through J. W. Bryan, general contractor, to Elizabeth Iron Works, Union, N. J.

420 tons, junior high school, Braintree, Mass., to John E. Cox Co., Fall River, Mass.; C. A. Batson, Brockton, Mass., general contractor.

250 tons, two, wf beam bridges, Bridgewater, Vt., to Vermont Structural Steel Co., Burlington, Vt.; Miller Construction Co., Windsor, Vt., contractor.

STRUCTURAL STEEL PENDING

8000 tons, Queens central repair shop, New York Dept. of Public Works, New York; bids Aug. 24; this project was erroneously reported as involving 4000 tons.

1700 tons, space research laboratories, Valley Forge, for General Electric Co., Schenectady, N. Y.

430 tons, pier 8, Brooklyn, N. Y., for Port of New York Authority, White Plains Iron Works, Beacon, N. Y., low bidder; also required, 295 tons of joists.

REINFORCING BARS . . .

REINFORCING BARS PLACED

119 tons, junior high school, Braintree, Mass., to Northern Steel Inc., Boston; C. A. Batson, Brockton, Mass., general contractor.

PLATES . . .

PLATES PLACED

1000 tons, two molasses tanks, Publicker Industries, Philadelphia, to Chicago Bridge & Iron Co., Chicago.

415 tons, two sulfur tanks, Atlantic Sulphur Terminal, Carteret, N. J., to Fisher Tank Co., Philadelphia.

PLATES PENDING

112 tons, Grade M, New York Naval Shipyard; bids Aug. 22, to the General Stores Supply Office, Navy, Philadelphia.

RAILS, CARS . . .

RAILROAD CARS PLACED

North American Car Co., 276 cars; 100, seventy ton meat refrigerator cars to the Pacific Car & Foundry Co., Renton, Wash.; 150, fifty ton meat refrigerator cars and 26, seventy ton, 10,000 gallon tank cars to its own shops.

Soo Line, five, 85 ft piggyback flatcars, to Pullman-Standard Div., Pullman Inc., Chicago.

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Exports Push Scrap Index Higher

Foreign requirements provide chief market support as STEEL's composite on No. 1 heavy melting steel rises 33 cents to $32.33, highest since late in May

Scrap Prices, Page 122

● **Philadelphia**—For the first time in weeks, domestic steel scrap prices have strengthened. No. 1 heavy melting rose $1 to $35 and No. 2 heavy melting to $31, delivered. No. 2 bundles are up 50 cents to $20-$21. Heavy breakable cast is up $2 a ton to $40. All changes are based on small orders.

The higher prices have developed despite prospects of a lag in Japanese buying later this year. Exports to Japan will be sustained through September, however, and European business is expected to hold up fairly well the rest of the year.

● **Pittsburgh**—The market is drifting aimlessly in the absence of consumer interest. Prices paid for B&O Railroad scrap were about the same as last month's. No. 1 heavy melting brought $37.75 a ton (vs. $37.35 last month). Random rails were off $1. A specialty steelmaker bought a small quantity of alloy-free short turnings at $24 a ton. Dealers have little hope for an upturn until steelmaking operations climb above the 70 per cent mark.

● **New York** — Brokers' buying prices are steady. Domestic trading continues dull, and in borings and turnings the market is nominal. However, export orders for open hearth grades are holding up well, and this tends to stabilize the market generally.

● **Chicago**—Scrap prices are holding despite the absence of sizable mill buying. There's no indication of a significant upturn in the steelmaking rate in the next few weeks, yet dealers are unwilling to sell much tonnage at the present market level. They're banking on climbing steel production in the near future, expecting the price of scrap to rise with the ingot rate.

Mills hold substantial inventories and are not disposed to build them up further, although it is the practice of some to acquire No. 1 industrial, heavy melting, return scrap from a selected list of customers. Even in this case, one mill is limiting the number of cars it will accept from brokers each day.

● **Cleveland** — Except for a little buying of No. 1 heavy melting steel at $34 in the Valley, the market continues lifeless. Expected improvement in orders for September shipment has not materialized, and brokers and dealers are now pointing for an October pickup. Resumption of mill buying on even a limited scale is thought certain to push prices on the steel grades up $1 a ton immediately. The foundries are buying scattered tonnages

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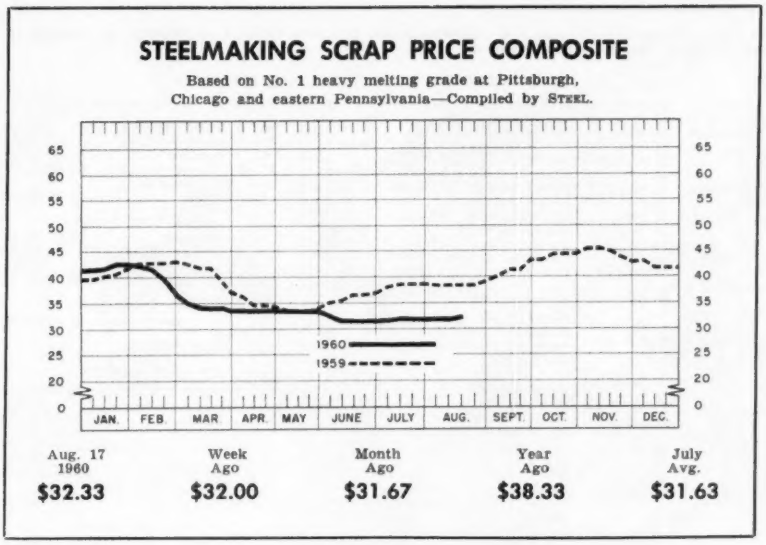


of cast material at unchanged prices.

• **Buffalo** — Dealers are actively shipping tonnage on August orders from area steel mills, and there is no change in the price structure. The market undertone is slightly firmer, with dealers' receipts down and August deliveries being stretched out through the month. Cast iron scrap is steady, but one small sale was reported at a price $2 under the generally recognized market level. Dealers say the tonnage was too small to have a bearing on the price structure.

• **Detroit**—The market is steady. A small Canadian order went out last week, but it was reported held up on delivery. No significant price changes are expected until the auto lists come out at the end of the month.

• **Cincinnati**—The outlook for an upturn in demand next month appears to be fading. Only scattered buying is reported by a district mill. Prices, however, remain unchanged with No. 1 heavy melting $26.50-$27.50.

• **St. Louis**—There has been little change in the market over the last few days. Rerolling rails are quoted $2 higher at $51, but, otherwise, prices are unchanged. Only small tonnages are moving.

• **Houston** — The market is unchanged. One major district mill expects no significant change in its operating rate this month. Less scrap is available in this market, reflecting the unattractive prices being quoted.

• **Seattle**—While scrap trade leaders here are optimistic, current demand is far from satisfactory. Exports are giving the market a firmer aspect, but otherwise trading is featureless. Exporters continue to assemble cargoes.

• **San Francisco**—Despite sluggish demand, scrap prices are not expected to be marked down here. For one thing, a drop in quotations would discourage collections and disorganize the collecting industry.

• **Los Angeles**—Dealers say the foreign market accounts for more than 80 per cent of their sales. Inquiry is off, and no improvement is in sight. The major steel mills are out of the market, and smaller buyers are taking only small tonnages.

Scrap Usage in June Lowest in Two Years

Consumption of ferrous materials (scrap and pig iron) in June totaled 9,171,000 gross tons (4,479,000 scrap and 4,692,000 pig iron), reports the U. S. Bureau of Mines. Excluding the months affected by the steel strike, use was the lowest since September, 1958.

The total metallics charge (excluding iron ore and agglomerates) in the month consisted of 49 per cent scrap and 51 per cent pig iron vs. 48 per cent scrap and 52 per cent pig iron in May.

Ferrous scrap stocks held by domestic consumers rose for the second straight month, on June 30 totaling 8,622,000 tons, 2 per cent greater than on May 31. Pig iron stocks totaled 3,124,000 tons, 1 per cent less than the 3,157,000 tons held at the end of the preceding month.

Home scrap produced in June accounted for 2,865,000 gross tons, 9 per cent less than during May. Purchased scrap received by consumers dropped for the fourth straight month and was 14 per cent less than during May. Of the purchased material, 79 per cent was received from dealers and 21 per cent from other sources.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 116

Wheeling Steel Corp. has taken out of service the No. 3 battery of coke ovens at its Steubenville (Ohio) Works for a $4.5 million rebuilding project. The project will require 12 months to complete. H. Nelson Lang, general manager of the plant, says the coke ovens as rebuilt will be of the same type as the No. 2 battery of Koppers ovens installed at the Steubenville Works in 1954.

Ford Motor Co. has launched a long range modernization program that will involve 183 of the company's 220 coke ovens at its Rouge plant in Dearborn, Mich. The four batteries of coke ovens (three with 61 ovens each, one with 37 units) will be modernized in sequence to insure the production of steel without interruption. The 220 ovens produce about 1,460,000 tons of coke annually.

Pig Iron . . .

Pig Iron Prices, Page 115

Merchant pig iron producers are more optimistic over prospects for September business. Foundry melt is expected to pick up, although not as much as desired. Shipments this month are showing the effects of foundry closings for vacations, and the low requirements of the appliance and farm equipment industries. Demand for automotive castings is gaining.

(*Please turn to Page* 127)

Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including broker's commission, as reported to STEEL, Aug. 17, 1960. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Aug. 17	$32.33
Aug. 10	32.00
July Avg.	31.63
Aug. 1959	38.64
Aug. 1955	43.97

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	30.00-31.00
No. 2 heavy melting	25.00-26.00
No. 1 dealer bundles	31.00-32.00
No. 2 bundles	24.00-25.00
No. 1 busheling	30.00-31.00
No. 1 factory bundles	37.00-38.00
Machine shop turnings	13.00-14.00
Mixed borings, turnings	13.00-14.00
Short turnings	18.00-19.00
Cast iron borings	17.00-18.00
Cut structurals:	
2 ft and under	37.00-38.00
3 ft and under	36.00-37.00
Heavy turnings	27.00-28.00
Punchings & plate scrap	39.00-40.00
Electric furnace bundles	37.00-38.00

Cast Iron Grades

No. 1 cupola	38.00-39.00
Stove plate	34.00-35.00
Unstripped motor blocks	25.00-26.00
Clean auto cast	37.00-38.00
Drop broken machinery	47.00-48.00

Railroad Scrap

No. 1 R.R. heavy melt.	*37.00-38.00*
Rails, 2 ft and under	50.00-51.00
Rails, 18 in. and under	51.00-52.00
Random rails	46.00-47.00
Angles, splice bars	45.00-46.00
Railroad specialties	47.00-48.00
Rails, rerolling	53.00-54.00

Stainless Steel Scrap

18-8 bundles & solids	175.00-180.00
18-8 turnings	95.00-100.00
430 bundles & solids	90.00-95.00
430 turnings	50.00-55.00

CHICAGO

No. 1 hvy melt., indus.	32.00-33.00
No. 1 hvy melt., dealer	30.00-31.00
No. 2 hvy melting	28.00-29.00
No. 1 factory bundles	37.00-38.00
No. 1 dealer bundles	31.00-32.00
No. 2 bundles	20.00-21.00
No. 1 busheling, indus.	32.00-33.00
No. 1 busheling, dealer	30.00-31.00
Machine shop turnings	15.00-16.00
Mixed borings, turnings	17.00-18.00
Shovel turnings	17.00-18.00
Cast iron borings	17.00-18.00
Cut structurals, 3 ft	35.00-36.00
Punchings & plate scrap	37.00-38.00

Cast Iron Grades

No. 1 cupola	42.00-43.00
Stove plate	36.00-37.00
Unstripped motor blocks	34.00-35.00
Clean auto cast	47.00-48.00
Drop broken machinery	47.00-48.00

Railroad Scrap

No. 1 R.R. heavy melt.	35.00-36.00
R.R. malleable	46.00-47.00
Rails, 2 ft and under	49.00-50.00
Rails, 18 in. and under	50.00-51.00
Angles, splice bars	43.00-44.00
Axles	53.00-54.00
Rails, rerolling	53.00-54.00

Stainless Steel Scrap

18-8 bundles, solids	175.00-180.00
18-8 turnings	95.00-100.00
430 bundles & solids	55.00-90.00
430 turnings	45.00-50.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	26.00-27.00
No. 2 heavy melting	14.00-15.00
No. 1 bundles	29.00-30.00
No. 2 bundles	15.50-16.50
No. 1 busheling	25.00-26.00
Machine shop turnings	10.00-11.00
Mixed borings, turnings	9.00-11.00
Shovel turnings	8.00-9.00

Cast Iron Grades

No. 1 Cupola	36.00-37.00
Stove plate	30.00-31.00
Heavy breakable	30.00-31.00
Unstripped motor blocks	22.00-23.00
Charging box cast	30.00-31.00
Clean auto cast	43.00-44.00

CLEVELAND

No. 1 heavy melting	31.00-32.00
No. 2 heavy melting	23.00-24.00
No. 1 factory bundles	34.00-35.00
No. 1 bundles	31.00-32.00
No. 2 bundles	17.00-18.00
No. 1 busheling	31.00-32.00
Machine shop turnings	12.00-13.00
Shovel turnings	16.00-17.00
Mixed borings, turnings	16.00-17.00
Cast iron borings	16.00-17.00
Cut foundry steel	34.00-35.00
Cut structurals, plate 2 ft and under	*38.00-39.00*
Low phos. punchings & plate	31.00-32.00
Alloy free, short shovel turnings	17.00-18.00
Electric furnace bundles	33.00-34.00†

Cast Iron Grades

No. 1 cupola	44.00-45.00
Charging box cast	33.00-34.00
Heavy breakable cast	30.00-31.00
Stove plate	39.00-40.00
Unstripped motor blocks	32.00-33.00
Brake shoes	35.00-36.00
Clean auto cast	50.00-51.00
Burnt cast	40.00-41.00
Drop broken machinery	50.00-51.00

Railroad Scrap

R.R. malleable	45.00-46.00
Rails, 2 ft and under	50.00-51.00
Rails, 18 in. and under	51.00-52.00
Rails, random length	44.00-45.00
Cast steel	38.00-39.00
No. 1 railroad cast	46.00-47.00
Railroad specialties	44.00-45.00
Angles, splice bars	46.00-47.00
Rails, rerolling	53.00-54.00

Stainless Steel Scrap (Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	175.00-180.00
18-8 turnings	75.00-80.00
430 clips, bundles, solids	90.00-95.00
430 turnings	20.00-30.00

YOUNGSTOWN

No. 1 heavy melting	33.00-34.00
No. 2 heavy melting	25.00-26.00
No. 1 busheling	33.00-34.00
No. 1 bundles	33.00-34.00
No. 2 bundles	20.00-21.00
Machine shop turnings	15.00-16.00
Shovel turnings	20.00-21.00
Cast iron borings	20.00-21.00
Low phos.	35.00-36.00
Electric furnace bundles	35.00-36.00

Railroad Scrap

No. 1 R.R. heavy melt.	34.50-35.50

BUFFALO

No. 1 heavy melting	29.00-30.00
No. 2 heavy melting	24.00-25.00†
No. 1 bundles	29.00-30.00
No. 2 bundles	21.00-22.00
No. 1 busheling	29.00-30.00
Shovel turnings	16.00-17.00
Machine shop turnings	12.00-13.00
Cast iron borings	14.00-15.00
Low phos. structurals and plate, 2 ft and under	37.00-38.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	40.00-41.00
No. 1 machinery	47.00-48.00

Railroad Scrap

Rails, random lengths	41.00-42.00
Rails, 3 ft and under	47.00-48.00
Railroad specialties	40.00-41.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	26.50-27.50
No. 2 heavy melting	22.50-23.50
No. 1 bundles	26.50-27.50
No. 2 bundles	17.50-18.50
No. 1 busheling	26.50-27.50
Machine shop turnings	10.00-11.00
Mixed borings, turnings	10.00-11.00
Shovel turnings	12.00-13.00
Cast iron borings	12.00-13.00
Low phos. 18 in.	35.00-36.00

Cast Iron Grades

No. 1 cupola	35.00-36.00
Heavy breakable cast	31.00-32.00
Charging box cast	35.00-36.00
Drop broken machinery	48.00-49.00

Railroad Scrap

No. 1 R.R. heavy melt.	32.00-33.00
Rails, 18 in. and under	51.00-52.00
Rails, random lengths	43.00-44.00

PHILADELPHIA

No. 1 heavy melting	*35.00*
No. 2 heavy melting	*31.00*
No. 1 bundles	36.00
No. 2 bundles	*20.00-21.00*
No. 1 busheling	36.00
Electric furnace bundles	37.00
Mixed borings, turnings	17.00†
Shovel turnings	21.00
Machine shop turnings	15.00
Heavy turnings	28.00†
Structurals & plates	38.00-40.00
Couplers, springs, wheels	40.00
Rail crop, 2 ft & under	51.00-52.00

Cast Iron Grades

No. 1 cupola	39.00
Heavy breakable cast	*40.00*
Drop broken machinery	50.00
Malleable	46.00

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	31.00-32.00
No. 2 heavy melting	21.00-22.00
No. 1 bundles	31.00-32.00
No. 2 bundles	16.00-17.00
Machine shop turnings	7.00-8.00†
Mixed borings, turnings	8.00-9.00†
Shovel turnings	9.00-10.00†
Low phos. structurals & plates	38.00-39.00

Cast Iron Grades

No. 1 cupola	36.00-37.00
Unstripped motor blocks	25.00-26.00
Heavy breakable	30.00-31.00

Stainless Steel

18-8 sheets, clips, solids	165.00-170.00
18-8 borings, turnings	80.00-85.00
410 sheets, clips, solids	55.00-60.00
430 sheets, clips, solids	70.00-75.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	24.00-24.50
No. 2 heavy melting	19.00-20.00
No. 1 bundles	24.00-24.50
No. 1 busheling	24.00-24.50
Machine shop turnings	6.00-7.00
Shovel turnings	8.50-9.00
No. 1 cast	39.00-40.00
Mixed cupola cast	33.00-33.50
No. 1 machinery cast	40.00-42.00

BIRMINGHAM

No. 1 heavy melting	29.00-30.00
No. 2 heavy melting	24.00-25.00
No. 1 bundles	32.00-33.00
No. 2 bundles	21.00-22.00
No. 1 busheling	31.00-32.00
Cast iron borings	10.00-11.00
Machine shop turnings	18.00-19.00
Shovel turnings	20.00-21.00
Bar crops and plate	35.00-36.00
Structurals & plate	35.00-36.00
Electric furnace bundles	32.00-33.00
Electric furnace:	
3 ft and under	31.00-32.00
2 ft and under	32.00-33.00

Cast Iron Grades

No. 1 cupola	46.00-47.00
Stove plate	46.00-47.00
Unstripped motor blocks	35.00-36.00
No. 1 wheels	37.00-38.00

Railroad Scrap

No. 1 R.R. heavy melt.	31.00-32.00
Rails, 18 in. and under	45.00-46.00
Rails, random lengths	39.00-40.00
Angles, splice bars	39.00-40.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	31.00
No. 2 heavy melting	28.00
No. 1 bundles	33.00
No. 2 bundles	19.00
No. 1 busheling	33.00
Machine shop turnings	9.00
Shovel turnings	11.00

Cast Iron Grades

No. 1 cupola	43.00
Charging box cast	36.00
Heavy breakable cast	34.00
Unstripped motor blocks	36.00
Clean auto cast	44.00
Stove plate	36.00

Railroad Scrap

No. 1 R.R. heavy melt.	32.00
Rails, random lengths	37.00
Rails, rerolling	*51.00*
Rails, 18 in. and under	41.00
Angles, splice bars	41.00

HOUSTON

(Brokers' buying prices; f.o.b. car)

No. 1 heavy melting	31.00
No. 2 heavy melting	29.00
No. 2 bundles	18.00
Machine shop turnings	11.00-12.00
Low phos. plate & structurals	38.00-39.00

Cast Iron Grades

No. 1 cupola	34.00-34.50
Heavy breakable	25.00
Foundry malleable	31.00†
Unstripped motor blocks	28.00-28.50

Railroad Scrap

No. 1 R.R. heavy melt.	34.00-35.00

LOS ANGELES

(For export)

No. 1 heavy melting	35.00-37.00
No. 2 heavy melting	*30.00†*
No. 1 bundles	35.00-36.00
No. 2 bundles	22.00-23.00
Machine shop turnings	17.00-23.00†
Shovel turnings	*18.00†*
Cast iron borings	17.00-20.00†
Cut structurals and plate 1 ft and under	*44.00*

Cast Iron Grades

No. 1 cupola	*42.00*

Railroad Scrap

No. 1 R.R. heavy melt.	39.00†

PORTLAND, OREG.

(Prepared, f.o.b. car)

No. 1 heavy melting	35.00-38.00
No. 2 heavy melting	32.00-35.00
No. 2 bundles	20.00
Shovel turnings	15.00
Electric furnace bundles	48.00

Cast Iron Grades

No. 1 cupola	35.00
Heavy breakable	33.00
Unstripped motor blocks	33.00
Stove plate (f.o.b. plant)	20.00

SEATTLE

(Prepared, f.o.b. car)

No. 1 heavy melting	38.50
No. 1 hvy (unprepared)	35.00
No. 2 heavy melting	35.50
No. 2 hvy (unprepared)	33.00
No. 2 bundles	23.00
Shovel turnings	15.00
Electric furnace bundles	48.00

Cast Iron Grades

No. 1 cupola	35.00
Heavy breakable cast	36.00
Unstripped motor blocks	33.00
Stove plate (f.o.b. plant)	20.00

SAN FRANCISCO

No. 1 heavy melting	34.00
No. 2 heavy melting	30.00
No. 1 bundles	30.00
No. 2 bundles	20.00
Machine shop turnings	14.00
Mixed borings, turnings	14.00
Cast iron borings	14.00
Heavy turnings	14.00
Shovel turnings	14.00
Cut structurals, 3 ft	40.00

Cast Iron Grades

No. 1 cupola	48.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	40.00
No. 1 wheels	34.00

HAMILTON, ONT.

(Brokers' buying prices; net tons)

No. 1 heavy melting	25.80
No. 2 hvy, melt, 2 ft & under	25.50
No. 1 bundles	25.80
No. 2 bundles	19.00
Mixed steel scrap	16.00
Mixed borings, turnings	12.00
Busheling, new factory:	
Prepared	25.50
Unprepared	20.45
Shovel turnings	12.00

Cast Iron Grades‡

No. 1 machinery cast	43.00

†Nominal.

‡F.o.b. Hamilton, Ont.

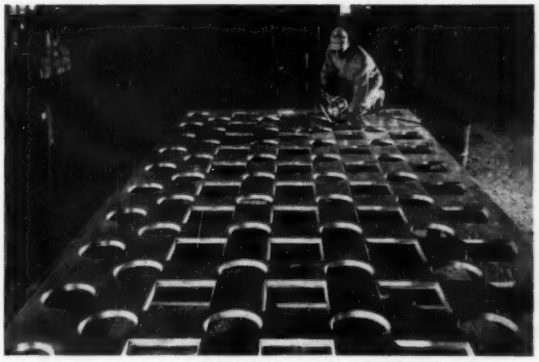
Eye Accidents Cut 92%, Compensation Ins. Costs Cut 51% at CPC Engineering with AO Protection Program

CPC ENGINEERING CORP., Sturbridge, Mass., fabricators of steel, aluminum, stainless steel components and pressure vessels, is another company that KNOWS eye protection pays off. Before installing an AO prevention program, eye injuries in this young, growth company were 120 per year and workmen's compensation insurance premiums $12,000. Currently eye injuries are ten per year and premiums are $5,800. The hours saved by the program are an additional advantage.

Another user of AO eye protection equipment, one of America's largest companies (a company that has prevented 51,000 eye accidents and saved $453,000 in 13 years) puts it this way: "The potential loss of an eye from the hazards of a work operation is the basic justification of an eye protection program. The additional potential dollar savings in medical and compensation costs and time per employee protected per year indicate that the program is self-supporting."*

*Records indicate an AO eye protection program can pay for itself in less than 6 months. Write for new booklet, "Eyes Are Expensive Targets".

Always insist on AO Trademarked Safety Products.



Worker sawing aluminum base plate for nuclear fuel storage rack.

American Optical
COMPANY
SAFETY PRODUCTS DIVISION
Southbridge, Massachusetts

Safety Service Centers in Principal Cities

Your Surest Protection . . . AO SURE-GUARD Products

Uncertainty Rules Nonferrous Scene

- Cubans Seize Freeport Nickel. Nicaro Next?
- Tin Price Keeps Weakening—Will Go Lower
- Chances Lessen for Lead-Zinc Tariff Help
- Custom Smelter Copper Price Could Drop Soon

Nonferrous Metal Prices, Pages 126 & 127

THE LONG EXPECTED seizure by the Cuban government of Moa Bay Mining Co., the nickel-cobalt mining and processing facilities owned by Freeport Sulphur Co., came in the wake of months of fruitless negotiations between Freeport and Cuban officials.

Freeport never really had a chance to operate the facilities. It opened the operation early this year but had to close down almost immediately because of the harsh mining tax laws passed by Premier Fidel Castro's regime. Talks were still underway when the seizure came.

• **What Value to Castro?**—What really perplexes Freeport is what Castro plans to do with the facilities now that he has them. Here's the point: Moa Bay produces a nickel-cobalt sulfide concentrate in slurry form that has to be transported (in specially constructed ships) to a company refinery in Port Nickel, La., where it's turned into metal. As far as Freeport knows, this is the only refinery in the world that can process the slurry. To build a new plant, or convert an existing one, would be extremely expensive and full of technical headaches.

Freeport says it will take "all possible steps under Cuban law and international law to protect its legal rights." Privately, officials say they hold little hope of getting the plant back.

The Cuban properties represent an investment of $61.5 million (an additional $13.5 million was to have been spent there). Another $44 million went to construct and equip the Port Nickel refinery, which now seems destined to remain idle.

• **Nicaro Next?**—The big unanswered question in nickel circles: Will the Castro government make its next move against the $85 million U. S. government-owned mining and processing complex at Nicaro? So far Castro has confined his seizures to privately owned enterprises.

Rumors have it Castro has signed an agreement to ship nickel behind the Iron Curtain.

In the last few weeks, the U. S. has been successful in moving the first Nicaro nickel out of Cuba since late winter. Two shipments totaling 12.5 million lb have swelled U. S. warehouse stocks. Metalmen estimate Nicaro nickel oxide sinter in the U. S. now totals around 25 million to 30 million lb—probably enough to last a year.

Tin to Weaken More

TIN PRICES are adjusting to the hard, cold facts of a weak market after having shown surprising midsummer strength.

On July 21, the domestic price climbed to 104.75 cents a pound, the highest it had been since 1956. It bounced around for a while and finally started down in early August.

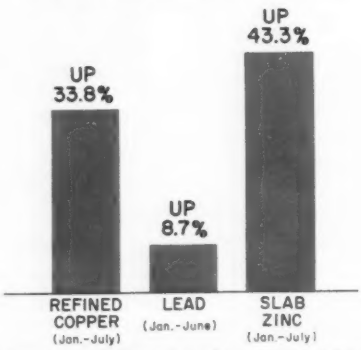
The strength in tin was a reaction to the uncertainty surrounding the breakdown of civil law in the Belgian Congo after it was given its independence July 1. The rich mineral properties in Katanga Province turn out about 1100 tons of the metal a month.

With the coming of greater stability to the region, this artificial prop has been removed.

The domestic market has been weak all summer. Tin platers, the metal's major customers, are getting few releases on prior bookings and are shoveling most of their production into inventory. The result is that tin sales are skimpy.

With no immediate sales stepup in sight, the outlook is for greater weakness in the tin price. Probable: A continued downtrend until the price hovers about $1 a pound.

PRODUCERS' STOCKS RISE AS SALES REMAIN WEAK



Sources: Copper Institute; American Bureau of Metal Statistics; American Zinc Institute Inc.

Lead-Zinc Bill Unlikely

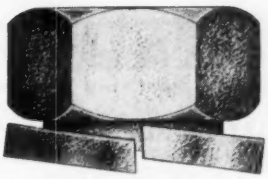
HERE'S the way Washington insiders size up chances of a bill to raise tariffs on lead and zinc passing this session of Congress. With congressmen chafing to get back to local constituencies to campaign for the November elections, only the "priority" legislation stands much chance of being enacted. The Kerr measure, which would hike duties on both metals, is a rider on a revenue bill for the Virgin Islands, which is not a particularly pressing piece of legislation. If passed, observers think chances are strong that the President will veto it.

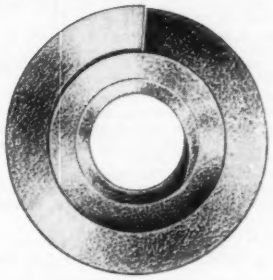
The Edmondson Bill, a measure to aid small producers, stands a better chance of passage and Presidential approval. Here, too, the time element may rule out its acceptance at this session.

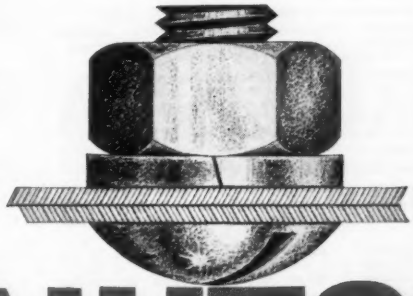
Custom Copper Weak

WITH greater stability in the world market, prices weakening on the London Metal Exchange, and continued poor business in the U. S., the custom smelter copper price is none too firm. If the business-political climate remains the same over the next few weeks, the price will probably fall.

new

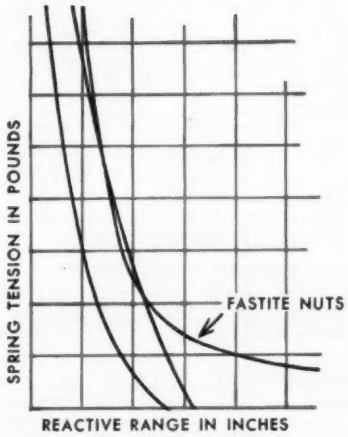






EATON-RELIANCE

FASTITE NUTS



Here is the answer to the growing need by designers and production men for more efficient fasteners on bolted assemblies. The Fastite assembly is a combination nut and helical spring washer, permanently held together, but free to rotate when pressure is applied.

Although it can be applied with equal or better speed than similar fasteners, the biggest advantage of the Fastite nut is the incorporation of the helical spring washer which provides a much greater reactive range and tension than other types of washers now being used.

Of three fasteners tested, the comparative release curve analysis showed the Fastite nut exerted 100 pounds more reactive spring tension when tight than either of the other two fasteners. More interesting, however, from the viewpoint of assembly problems is that the other fasteners lost all reactive spring tension when backed off to .016 inches whereas the Fastite nut still registered 150 pounds. In fact, the Fastite nut still showed reactive tension at .070 inches. The comparative curves are shown at left. A detailed graph of these curves is available for your inspection in the Engineering Bulletin offered below.

Translated into terms of product quality, this simply means the Eaton-Reliance Fastite nut is the best fastener available to reduce the incidence of failure in bolted components due to the ever present problems of bolt stretch and thread wear. Specify Eaton-Reliance Fastite nuts on your next order.

Send for Fastite Nuts Engineering Bulletin, no obligation.

EATON

RELIANCE DIVISION
MANUFACTURING COMPANY
514 CHARLES AVENUE • MASSILLON, OHIO

SALES OFFICES: New York • Cleveland • Detroit • Chicago • St. Louis • San Francisco • Los Angeles

Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, 50 lb ingots, 26.00, 30,000 lb or more, f.o.b. customer custody.

Aluminum Alloy: No. 13, 25.90; No. 43, 26.20; No. 195, 30.70; No. 214, 31.50; No. 356, 26.80, 50 lb ingots.

Antimony: R.M.M. brand, 99.5%, 29.00; Lone Star brand, 29.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 25.00-26.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $71.50 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $65 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment data, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.50 per lb deld.

Cobalt: 99+%, $1.50 per lb for 500-lb keg, $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.

Columbium: Powder, $55-85 per lb nom.

Copper: Electrolytic, 33.00 deld.; custom smelters, 33.00; lake, 33.00 deld.; five refined, 32.75 deld.

Germanium: First reduction, ingots, less than 1 kg, 36.00-37.50 per gram; 1-10 kg, 30.50-32.00 per gram; 10 kg or more, 28.10-29.99 per gram; intrinsic grade, under 10 kg, $1.95 per gram; 10 kg or more, 29.95 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $70-75 per troy oz nom.

Lead: Common, 11.80; chemical, 11.90; corroding, 11.90, St. Louis, New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 24 lb, $11 per lb f.o.b. Minneapolis; 24-99 lb, $9.50; 100-499 lb, $9.25; 500 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75, f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $210-212 per 75 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-7.0 in. diam., 50-4999 lb, $8.15-11.50 per lb, depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot for addition to cast iron, in kegs, 74.50; "F" nickel, 5 lb ingots, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel, 69.60.

Osmium: $70-90 per troy oz nom.

Palladium: $24-26 per troy oz.

Platinum: $82-85 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $137-140 per troy oz.

Ruthenium: $45-50 per troy oz.

Selenium: $6.50-7 per lb, commercial grade.

Silver: Open market, 91.375 per troy oz.

Sodium: Solid pack, c.l., 19.50; l.c.l., 20.00; brick, c.l., 21.00; l.c.l., 21.50; tank car 17.00.

Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom; sheet, $55 per lb nom.

Tellurium: $3.50 per lb, 100 lb or more.

Thallium: $7.50 per lb.

Tin: Straits, N. Y., spot and prompt, 102.125.

Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max.), $1.60 per lb; grade A-2 (0.5% Fe max.), $1.50 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 1000-lb lots, $2.75-2.90 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00; 99+% hydrogen reduced, $3.35-4.50.

Zinc: Prime western, 13.00; brass special, 13.25; intermediate, 13.00, East St. Louis, freight allowed over 0.50 per lb, New York basis, add 0.50. High grade, 14.35; special high grade, 14.50 deld. Diecasting alloy ingot No. 3, 16.25; No. 2, 16.75; No. 5, 16.50 deld.

Zirconium: Reactor grade sponge, 100 lb or less, $8 per lb; 100-500 lb, $7 per lb; over 500 lb, $6.50 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys 26.25-28.00; No. 12 foundry alloy (No. 2 grade), 23.75-24.25; 5% silicon alloy, 0.60 Cu max., 25.00-25.25; 13 alloy, 0.60 Cu max., 25.00-25.25; 195 alloy, 26.75-27.75; 108 alloy, 24.25-24.75. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 25.00; grade 2, 23.75; grade 3, 22.75; grade 4, 22.25.

Brass Ingot: Red brass, No. 115, 29.25; tin bronze, No. 225, 39.50; No. 245, 34.00; high-leaded tin bronze, No. 305, 33.75; No. 1 yellow, No. 405, 23.75; manganese bronze, No. 421, 28.25.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.975, f.o.b Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.955, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 38.35; l.c.l., 38.93. Weatherproof, 20,000-lb lots, 38.55; l.c.l., 39.30.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $17.50 per cwt; pipe, full coils, $17.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheet and strip, $6.75-15.50; sheared mill plate, $5.25-9.00; wire, $5.55-9.50; forging billets, $3.20-4.75; hot-rolled and forged bars, $3.80-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $14.00-25.00; H.R. strip, $12.50-22.90; C.R. strip, $15.90-31.25; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	138	120	138
Strip, C.R.	124	108	138
Plate, H.R.	130	110	126
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
0.250-0.136	24-72	72-180	45.40-48.00
0.136-0.096	24-72	72-180	45.90-48.80
0.096-0.077	24-72	72-180	46.40-50.30
0.077-0.068	24-72	72-180	46.90-52.10
0.068-0.061	24-72	72-180	46.90-55.00
0.061-0.048	24-72	72-180	47.40-57.70
0.048-0.038	24-72	72-180	47.90-60.50
0.038-0.030	24-72	72-180	48.40-65.30
0.030-0.024	24-72	72-180	48.90-67.20
0.024-0.019	24-60	72-180	49.40-59.90
0.019-0.017	24-48	72-144	50.30-57.00
0.017-0.015	24-48	72-144	51.20-58.00
0.015-0.014	24-36	72-144	52.30
0.014-0.012	24-36	72-144	53.50
0.012-0.011	24-36	72-144	54.60
0.011-0.0095	24-46	72-144	56.20
0.0095-0.0085	24-36	72-96	57.50
0.0085-0.0075	24-36	72-96	59.20
0.0075-0.007	24-36	72-96	60.80
0.007-0.006	24-36	72-96	62.50

ALUMINUM (continued)

Plates and Circles: Thickness, 0.25-3 in.; width or diam., 24-60 in.; lengths, 72-240 in., mill finish.

Alloy	Plate Base	Circle Base
1100, 3003-F	44.60	50.90
5050-F	45.70	50.50
3004-F	46.70	52.40
5052-F	47.30	53.10
6061-T6	47.80	53.90
2024-T4*	51.80	58.90
7075 T6*	60.50	67.90

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 base, 12 ft lengths

Diam. (in.)*	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
0.125	74.90	77.30	....	....
0.188	63.20	66.20	....	80.10
0.250	60.00	62.60	72.70	74.10
0.375	59.20	63.80	71.00	72.00
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	59.20	63.80	71.00	72.00
0.625	59.20	63.80	67.80	67.90
0.750	57.70	62.00	61.60	63.80
0.875	57.70	62.00	61.60	63.80
1.000	57.70	62.00	61.60	63.80
1.125	55.30	59.50	59.50	61.50
1.250	55.30	59.50	59.50	61.50
1.375	55.30	59.50	59.50	61.50
1.500	55.30	59.50	59.50	61.50
1.625	53.00	56.70	....	59.30
1.750	53.00	56.70	58.30	59.30
1.875	53.00	56.70	....	59.30
2.000	53.00	56.70	58.30	59.30
2.250	51.50	55.00	....	59.30
2.500	51.50	55.00	....	59.30
2.750	49.90	53.20	....	59.30
3.000	49.90	53.20	....	59.30
3.250	....	53.20	....	....
3.375	....	53.20	....	....

*Selected sizes.

Forging Stock: Round, Class 1, random lengths, diam., 0.375-8 in., "F" temper; 2014, 47.50-57.60; 6061, 43.50-57.60; 7075, 61.80-71.90; 7079, 66.80-76.90.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes: 1 in., 32.00; 1¼ in., 43.40; 1½ in., 51.80; 2 in., 62.60; 3 in., 124.95; 4 in., 171.80; 5 in., 233.15; 6 in., 308.55; 8 in., 464.35; 10 in., 716.25 (3-24 ft lengths).

Extruded Solid Shapes:

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	45.30-46.80	54.00-60.00
15-17	45.30-46.80	56.50-61.80
18-23	45.80-47.50	58.60-67.60
24-32	45.80-47.50	66.80-81.50
33-38	49.50-52.20	85.10-96.60
39-44	59.80-63.60	102.00-124.00

MAGNESIUM

Sheets and Plates: AZ31B standard grade, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24-72 in. widths; .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.00 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grade (AZ31B)
6-8	65.30-67.60	94.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 23.00-23.50; No. 2 heavy copper and wire, 20.00-20.50; light copper, 18.00-18.50; No. 1 composition red brass, 17.00-17.25; No. 1 com-

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES e (Based on copper at 30.00c)		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes	Clean Heavy	Rod Ends	Clean Turnings
Copper	50.00b	54.86c	....	58.32	29.000	29.000	28.250
Yellow Brass	50.57	36.06d	50.86	54.23	22.250	21.250	20.250
Low Brass, 80%	53.53	53.22	53.82	57.09	24.750	24.500	24.000
Red Brass, 85%	54.58	54.27	54.87	58.14	25.750	25.500	25.000
Com. Bronze, 90%	56.17	55.86	56.46	59.48	26.750	26.500	26.000
Manganese Bronze	58.86	52.21	62.69	....	20.875	26.625	19.875
Muntz Metal	53.20	48.26	....	....	20.875	20.625	20.125
Naval Brass	55.12	48.48	61.43	58.78	20.750	20.500	20.000
Silicon Bronze	62.86	61.80	62.15	80.79	28.375	28.125	27.375
Nickel Silver, 10%	65.98	68.06	68.06	....	26.875	26.625	14.937
Phos. Bronze	77.44	78.19	77.69	79.37	29.875	29.625	28.625

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb.

position turnings, 15.50-15.75; new brass clippings, 14.00-14.50; light brass, 10.50-10.75; heavy yellow brass, 11.50-11.75; new brass rod ends, 12.50-12.75; auto radiators, unsweated, 12.50-12.75; cocks and faucets, 13.50-14.00; brass pipe, 14.00-14.50.

Lead: Soft scrap lead; 8.00-8.25; battery plates, 3.00-3.25; linotype and stereotype, 9.00-9.50; electrotype, 8.00-8.25; mixed babbitt, 9.50-10.00.

Monel: Clippings, 23.00-24.00; old sheets, 22.00-23.00; turnings, 16.50-17.50; rods, 22.00-23.00.

Nickel: Sheets and clips, 50.00-51.00; rolled anodes, 50.00-51.00; turnings, 39.00-41.00; rod ends, 50.00-51.00.

Zinc: Old zinc, 3.00-3.50; new diecast scrap, 4.25-4.50; old diecast scrap, 2.75-3.00.

Aluminum: Old castings and sheets, 10.50-11.00; clean borings and turnings, 6.50-7.00; segregated low copper clips, 14.00-14.50; segregated high copper clips, 13.00-13.50; mixed low copper clips, 14.00-14.50; mixed high copper clips, 12.00-12.50.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 11.50-12.00; clean borings and turnings, 9.00-9.50; segregated low copper clips, 16.00-16.50; segregated high copper clips, 14.50-15.00; mixed low copper clips, 14.00-14.50; mixed high copper clips, 13.50-14.00.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 11.00-11.25; clean borings and turnings, 9.50-10.00; segregated low copper clips, 14.75-15.00; segregated high copper clips, 14.00-14.50; mixed low copper clips, 14.00-14.50; mixed high copper clips, 13.50-14.00.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)
Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 59.00; light scrap, 54.00; turnings and borings, 39.00.

Copper and Brass: No. 1 heavy copper and wire, 27.75; No. 2 heavy copper and wire, 26.00; light copper, 23.50; refinery brass (66% copper) dry copper content, 23.75.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 27.75; No. 2 heavy copper and wire, 26.00; light copper, 23.50; No. 1 composition borings, 21.00; No. 1 composition solids, 21.50; heavy yellow brass solids, 16.50; yellow brass turnings, 14.50; radiators, 17.50.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.50.
Copper: Flat-rolled, 50.04; oval, 46.50, 5000-10,000 lb, electrodeposited, 42.00, 2000-5000 lb lots; cast, 44.50, 5000-10,000 lb quantities.
Nickel: Depolarized, less than 1000 lb, 114.25; 100-499 lb, 112.00; 500-4999 lb, 107.50; 5000-29,999 lb, 105.25; 30,000 lb, 103.00. Carbonized, deduct 3 cents a lb.
Tin: Bar or slab, less than 200 lb, 120.50; 200-499 lb, 119.00; 500-999 lb, 118.50; 1000 lb or more, 118.00.
Zinc: Balls, 20.50; flat tops, 20.50; flats, 23.25; ovals, 22.50, ton lots.

CHEMICALS

Cadmium Oxide: $1.50 per lb in 100-lb drums.
Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.

Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,000 lb, 61.90.

Copper Sulphate: 100-1900 lb, 16.00; 2000-5900 lb, 14.00; 6000-11,900 lb, 13.75; 12,000-22,900 lb, 13.50; 23,000 lb or more, 13.00.

Nickel Chloride: 100 lb, 45.00; 200 lb, 43.00; 300 lb, 42.00; 400-4900 lb, 40.00; 5000-9900 lb, 38.00; 10,000 lb or more, 37.00.

Nickel Sulphate: 5000-22,999 lb, 29.00; 23,000-39,900 lb, 28.50; 40,000 lb or more, 28.00.

Sodium Cyanide (Cyanobrik): 200 lb, 23.80; 400-800 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 79.50; 100-600 lb, 70.20; 700-1900 lb, 67.40; 2000-9900 lb, 65.60; 10,000 lb or more, 64.20.

Stannous Chloride (Anhydrous): 25 lb, 155.00; 100 lb, 150.10; 400 lb, 147.70; 800-19,900 lb, 106.80; 20,000 lb or more, 100.70.

Stannous Sulphate: Less than 50 lb, 140.20; 50 lb, 110.20; 100-1900 lb, 108.20; 2000 lb or more, 106.20.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(*Concluded from Page* 121)

Interlake Iron Corp. shut down its blast furnace at the Zenith plant, Duluth, because of lack of business. On the other hand, U. S. Steel Corp. has reactivated the No. 1 blast furnace at its South Works, South Chicago, Ill. It also relighted one of two blast furnaces of the American Steel & Wire Div. at Cleveland.

Iron Ore . . .

Iron Ore Prices, Page 116

The first cargo of pelletized iron concentrates produced from low grade, nonmagnetic ore in Michigan's Upper Peninsula was delivered by Humboldt Mining Co. to Ford Motor Co.'s Rouge plant recently. The pellets contain more than 60 per cent iron. Humboldt Mining is jointly owned by Ford and Cleveland-Cliffs Iron Co.

Sluggish steelmaking operations are reflected in continued slowing down of iron ore shipping on the Great Lakes. As of Aug. 15, there were only 159 ore carriers in commission, 68.83 per cent of the overall fleet. On July 15, 183 vessels were operating, while on Aug. 15, 1959 (when the steel strike was on) only 37 were engaged.

Canadian iron ore mines are counting on an autumn pickup in U. S. steelmaking to give demand a lift. Canadian ore sales are up 6 per cent this year (first five months).

In the first five months this year, Canadian mines shipped 4 million tons of ore—all but 900,000 tons went to the U. S. and overseas.

Refractories . . .

Refractories Prices, Page 116

Kaiser Refractories & Chemicals Div., Kaiser Aluminum & Chemical Corp., Oakland, Calif., will build a $500,000 facility at Columbiana, Ohio, for the manufacture of tar bonded refractories required in the basic oxygen steelmaking process.

The plant is scheduled to be in operation by about the first of the year and will turn out a product similar to that made by Kaiser at Moss Landing, Calif.

Three new lines of firebricks have been developed by Babcock & Wilcox Co.'s Refractories Div., Augusta, Ga., as the result of two

CLASSIFIED

Help Wanted

ENGINEERS
DESIGNERS

Permanent positions with Arthur G. McKee & Company at their Cleveland offices for **ENGINEERS, DESIGNERS, DRAFTSMEN** who are experienced in any type of Steel Plant or Steel Plant Equipment design. Applications will be kept confidential.

Send detailed resume and photo to:

G. VICTOR HOPKINS

ARTHUR G. McKEE & COMPANY
2300 Chester Ave. Cleveland 1, Ohio

HELP WANTED

Manufacturer of Tension and Heavy Duty Steel Strapping requires a distributor on commission basis. Must have had previous experience in the selling of this product. All applications will be kept confidential. Attractive proposition for those who can qualify.

Please reply to:

Box 866, STEEL
Penton Bldg. Cleveland 13, Ohio

Machinery and Equipment Wanted

WANTED
Punches, spacing tables, column facers, crane bridges—5 to 20 ton capacity, crane runways. Also other structural steel fabricating equipment. Contact P. M. Proos, Production Manager,
KLINE IRON AND STEEL COMPANY
P. O. Box 1013 Columbia, South Carolina.
ALpine 4-0301

WANTED

Steel Turning Crusher
In good operating condition.

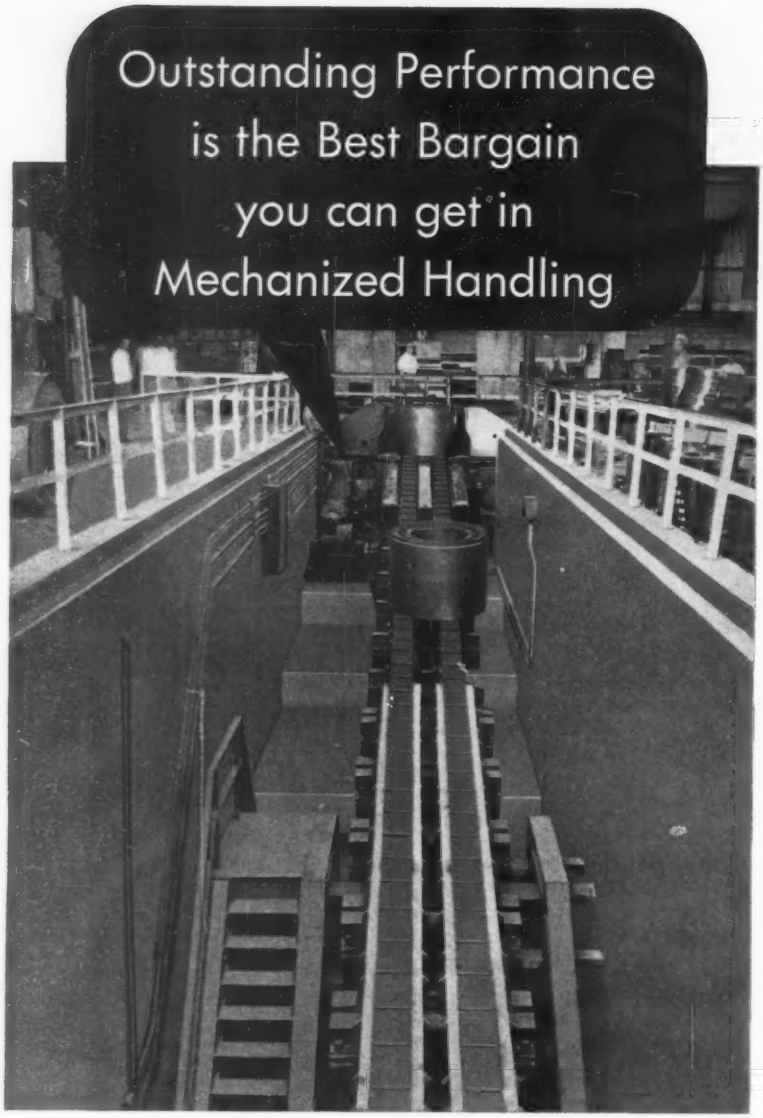
Telephone Arnold L. Growick Co.
Albany, N. Y. Hobart 3-7272

Positions Wanted

GRADUATE ENGINEER—25 years in Steel Fabrication. Experienced in Engineering, Costs and Production Management. Reply Box 867, STEEL, Penton Bldg., Cleveland 13, Ohio.

CLASSIFIED RATES

All classifications other than "Position Wanted" set solid, 50 words or less $18.00, each additional word .36; all capitals, 50 words or less $21.00, each additional word .45; all capitals leaded, 50 words or less $25.00, each additional word .55. "Position Wanted" set solid, 25 words or less $5.00, each additional word .20; all capitals, 25 words or less $6.50, each additional word .26; all capitals leaded 25 words or less $8.00, each additional word .32. Keyed address takes seven words. Cash with order necessary on "Position Wanted" advertisements. Replies forwarded without charge. Displayed classified rates on request. Address your copy and instructions to STEEL, Penton Building, Cleveland 13, Ohio.



• Many plant operating people responsible for specifying conveying systems today are demanding equipment that is right *for them*—that will fully meet *their* individual requirements—that is built to operate under severe service. They are looking beyond the price—to design and quality.

Mathews Engineers are giving these people a complete conveyer service — from the first proposal through installation—and equipment that is delivering outstanding performance in the metalworking industries.

GENERAL OFFICES ..... MATHEWS CONVEYER COMPANY
Ellwood City, Pennsylvania
WESTERN DIVISION ..... MATHEWS CONVEYER COMPANY WEST COAST
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Over Fifty Years of Leadership in Mechanized Handling

MATHEWS

years' study. Based on industry classifications, KAO-HB is a high burn, superduty brick; KAO-60 is 60 per cent alumina; KAO-70 is 70 per cent alumina.

Carbide Prices Increased

An increase of 7 per cent on the base price of all V-R carbide and Tantung products was effected Aug. 15 by Vascoloy-Ramet Corp., Waukegan, Ill. It was the first general increase in carbide prices since 1945. Toolholders and toolholder parts, face mill cutters, and brazing shims are not included in the increase.

Tin Plate . . .

Tin Plate Prices, Page 112

Demand pressure for tin plate is slipping as canmakers' requirements for this year's food pack slacken. However, the mills are sold out for weeks ahead. Some producers can't fill orders for six or seven weeks. The third quarter is the busiest period for canners, and is usually the peak period for tin plate.

Distributors . . .

Prices, Page 115

Steel service centers report virtually no gain in business, but are more cheerful about the outlook for September. They believe that the passing of vacations and hot weather will stimulate buying interest. They also expect a little more tonnage as soon as mill shipments tighten, probably next month.

Distributors are ordering from the mills only what they need to fill holes in their inventories and generally insist on prompt shipments.

Manganese Ore . . .

Domestic mine shipments of manganese ore in April decreased 7 per cent from the March total to 6700 net tons, reports the Bureau of Mines. Imports of ore containing 35 per cent or more manganese totaled 198,255 tons, a decrease of 18 per cent from March, as compiled by the Bureau of the Census. Imports of ferromanganese (5730 tons of ore equivalent) were one-third those reported for March. Total quantity of new material (domestic mine shipments plus imports of ore and alloy in terms of ore) declined 21 per cent from March to 210,685 tons.

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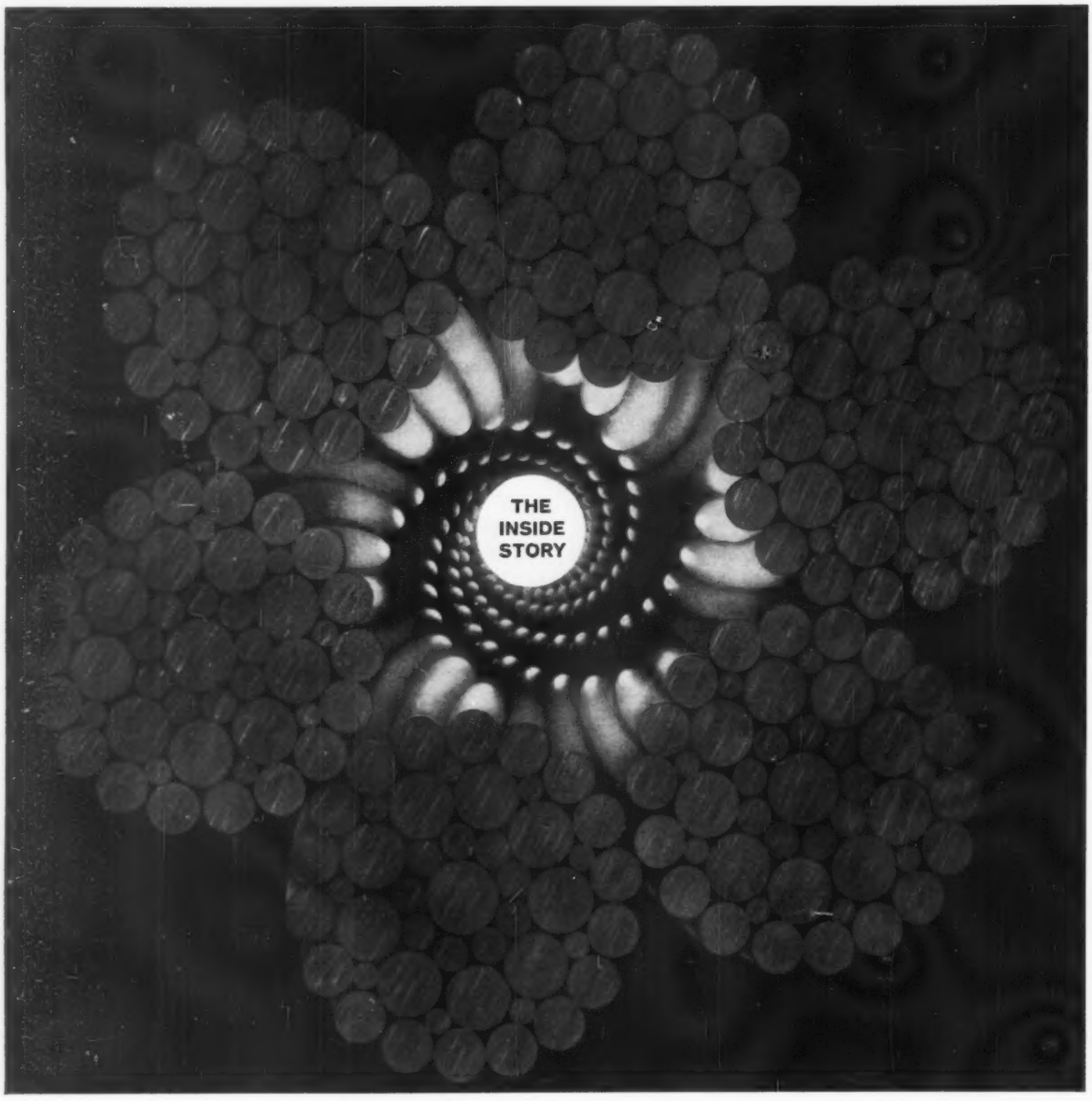
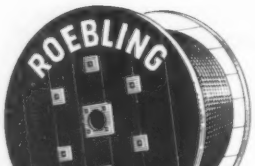
TO FIND THE MAN YOU NEED . . .

Place an advertisement in the "Help Wanted" columns of STEEL's classified pages. Your advertisement will reach the qualified men you need, because STEEL is addressed to highly-trained men in all phases of metalworking

STEEL
The Metalworking Weekly





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ROEBLING ROYAL BLUE WIRE ROPE This is rather a long view of a wire rope that's a real work horse. Time and tests have taught us at Roebling that wire rope users *want* the long view. What else, they say, are they spending their money for?

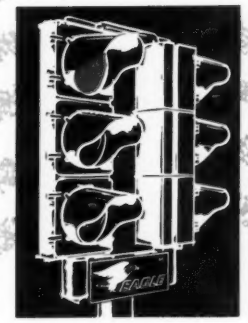
Here, you're looking through a length of Royal Blue whose core has been removed to show the uniformity and symmetry of the rope structure. You see how concerned we are with internal security.

This is one of the reasons why Royal Blue lives up to the day-to-day demands made upon it. High stresses and unavoidable overloads, abrasion, fatigue, impact, crushing, sheave pressures and abusive drum-winding, to name the major ones.

We have to know that the rope we build will do what we sell it to do. Numerous quality-control measures help us—as they do you—to take the long view of Royal Blue. For details about long-lasting Roebling Royal Blue, ask your wire rope distributor or write Roebling's Wire Rope Division, Trenton 2, New Jersey.

ROEBLING

Branch Offices in Principal Cities • John A. Roebling's Sons Division • The Colorado Fuel and Iron Corporation



THERE'S A NEW DIMENSION AT BLISS

...we've added public safety to our business

You probably know Bliss as a builder of presses . . . of rolling mills . . . or of other heavy equipment. Some think of us – and rightly so – as a "turn-key" plant contractor. Now, to this 100-year tradition of developing and building metalworking machinery, we have added the Gamewell Company, a firm with a century-old tradition of its own: Public Safety. Thanks to the acquisition of Gamewell, we're in fire alarm systems, fire fighting equipment, traffic control systems, and a host of other related products.

Each Gamewell division will go on serving its customers just as it has in the past, with the same people and the same policies. If your question relates to fire alarm systems, call Gamewell. For traffic signals or timers, it's Eagle Signal. For fire fighting equipment, it's still Rockwood Sprinkler.

All this makes Bliss' stake in America larger than ever before. It has gone far beyond the expansion and modernization of manufacturing industry. It lies in our expanding suburban areas . . . in urban growth and redevelopment . . . in our spreading highway system. It's an exciting, interesting and rewarding field.

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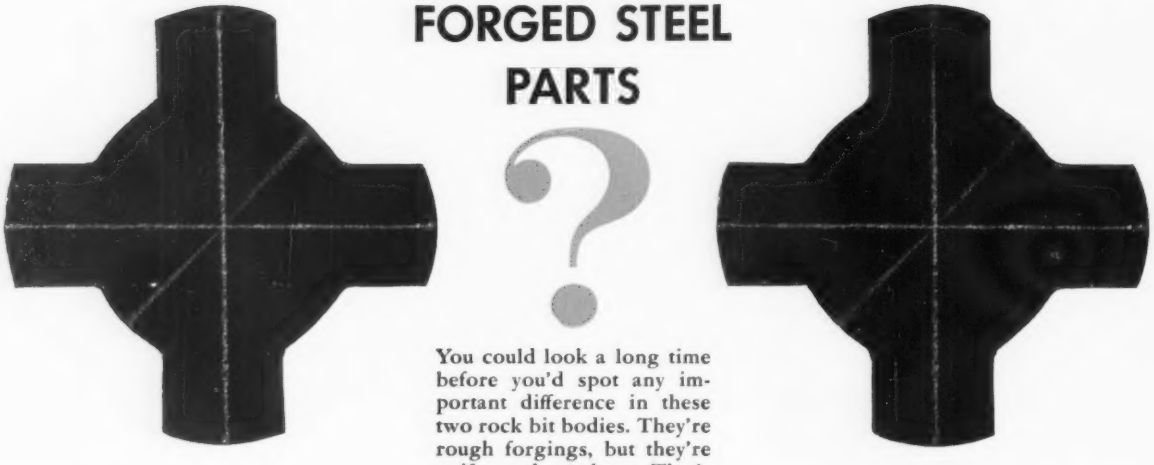
BLISS is more than a name—it's a guarantee

CAN YOU SPOT THE DIFFERENCE IN THESE FORGED STEEL PARTS



You could look a long time before you'd spot any important difference in these two rock bit bodies. They're rough forgings, but they're uniform throughout. That's because they're made from Timken® fine alloy steel forging bars. Timken steel is uniform in structure, chemistry and dimension from order to order and it's this exceptional uniformity that cuts out costly interruptions in your forging operations for adjustment of equipment. What's more, high quality is yours in every order of Timken steel. Research, individual handling of your order, careful inspection and expert care assure this.

When you buy Timken steel you get: 1) Quality that's uniform from heat to heat, bar to bar, order to order—targeted to *your* end-use. 2) Service from the experts in specialty steels. 3) Over 40 years experience in solving tough steel problems. May we solve yours? Call or write: The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable: "TIMROSCO". Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits.

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